Prospective Country Evaluation

Democratic Republic of the Congo

2019-2020 ANNUAL COUNTRY REPORT

Commissioned by the Global Fund's Technical Evaluation Reference Group (TERG)

PATH

IHME

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Acronyms and Abbreviations

AL	Artemether-Lumefantrine
ANC	Antenatal care
ART	Antiretroviral therapy
ASAQ	Artesunate-Amodiaquine
BCZ	Bureau Central de Zone de Santé
CAG	Cellule d'Appui et de Gestion
CCM	Country Coordinating Mechanism
CDR	Regional distribution centers
CEP	Country Evaluation Partner
COE	Challenging operating environment
Cordaid	Catholic Organization for Relief and Development Aid
CSW	Commercial sex worker
CSDT	Centre de santé de dépistage et traitement de la tuberculose
CT	Country Team
DFID	Department for International Development (UK)
DHIS	District Health Information Software
DPS	Division Provinciale de la Santé (provincial health divisions)
DRC	Democratic Republic of the Congo
DSNIS	Division du Système National d'Information Sanitaire
EPSS	Évaluation des Prestations des Services de soins de Santé
EUV	End User Vérification (vérification de l'utilisation finale)
GEP	Global Evaluation Partner
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit
GOS	Grant Operating System
GTM	Groupe Technique Médicament
HMIS	Health management information systems
HZ	Health zone (zone de santé)
iCCM	Integrated community case management
IHME	Institute for Health Metrics and Evaluation
IBBS	Integrated Bio-Behavioral Survey
IPS	Inspection Provinciales de la Santé
IPTp	Intermittent preventive treatment in pregnancy
ITN	Insecticide-treated net
KII	Key informant interview
LFA	Local Fund Agent
LLIN	Long-lasting insecticide-treated net
M&E	Monitoring and evaluation
MDR-TB	Multidrug-resistant tuberculosis
MoH	Ministry of Health
MOU	Memorandum of Understanding
MSM	Men who have sex with men
NFM	New funding model
NSRP	National Strategic Response Plan
OIG	Office of Inspector General
PBF	Performance-based financing
PCE	Prospective Country Evaluation
PEPFAR	President's Emergency Plan for AIDS Relief (U.S.)
PITC	Provider-initiated testing and counseling
PLHIV	People living with HIV
PNLP	National Malaria Control Program (Programme National de Lutte contre le Paludisme)
PNLS	National AIDS Control Program (Programme National de Lutte contre le Sida)
PNLT	National TB Control Program (Programme National de Lutte contre le Tuberculose)

PR	Principal Recipient
PSSP	Progrès Santé Sans Prix
PU/DR	Progress update/disbursement request
PWID	People who inject drugs
RCA	Root cause analysis
RDT	Rapid diagnostic test
RENADEF	Réseau National des ONG pour le Développement de la Femme
RSSH	Resilient and sustainable systems for health
SNIS	National Health Information System (Système National d'Information Sanitaire)
SP	Sulfadoxine-pyrimethamine
SR	Sub-recipient
SSC	Sites de soins communautaires
TERG	Technical Evaluation Reference Group
TRP	Technical Review Panel
UCOP+	Union Congolaise des organisations des PvVIH
VCT	Voluntary counseling and testing
VfM	Value for money
WHO	World Health Organization

Executive summary

The Prospective Country Evaluation (PCE) is an independent evaluation of the Global Fund commissioned by the Global Fund's Technical Evaluation Reference Group (TERG). The Democratic Republic of the Congo is classified as a high impact portfolio and challenging operating environment (COE), with the HIV burden designated as high, the tuberculosis burden as severe and the malaria burden as extreme. Throughout 2019, the PCE evaluated trends in Global Fund investments and grant implementation and developed findings and strategic recommendations in order to provide high quality, actionable, timely information to implementing partners and Global Fund policymakers.

The PCE uses process evaluation methods including multiple primary data sources such as Key Informant Interviews (KIIs), fact checking interviews, process tracking, document review and non-participant meeting observations. These data were triangulated with quantitative analyses using the Health Management Information System (*Système National d'Information Sanitaire*; HMIS) and routine data provided by national disease programs. The evaluation focuses on examining grant allocations compared to expenditure (grant analysis and resource tracking), tracing inputs to outputs and outcomes and analyzing thematic areas including resilient and sustainable systems for health and the provincial approach.

HIV/AIDS

With an estimated 92% of diagnosed people living with HIV (PLHIV) enrolled on antiretroviral therapy (ART), DRC has surpassed the second of the 90-90-90 goals. Case identification, however, is low relative to the first 90: only 62% of PLHIV knew their HIV status in 2018. As a result, the National AIDS Control Program (*Programme National de Lutte contre le Sida*; PNLS) finalized a new National Strategic Response Plan (NSRP) for HIV in April 2018 that represents a transition from voluntary counseling and testing (VCT) for the general population to provider-initiated testing and counseling (PITC) based on risk behaviors and self-identification of key and priority populations. While the new HIV testing strategy is widely accepted by national stakeholders, it has not been widely disseminated to health facilities in Global Fund-supported provinces, resulting in a lack of risk-based PITC and relatively low rates of case identification per test performed. In addition, health facilities continue to use HIV tests designated for risk-based PITC for voluntary and provider-initiated testing of people at a low risk for HIV, resulting in persistent stock outs of first line HIV tests.

Malaria

DRC has made significant progress in decreasing malaria mortality, from 202.3 deaths per 100,000 population in 2000 to 100.4 in 2017. A reduction was observed for malaria incidence between 2000 and 2015, however the trend has been increasing since 2016. Positive trends were the result of considerable progress in a number of intervention areas, including the distribution of long-lasting insecticide treated nets (LLINs), the availability of treatment and the percentage of suspected malaria cases confirmed using microscopy or rapid diagnostic tests (RDTs). Since 2013, the National Malaria Control program (*Programme National de Lutte contre le Paludisme*; PNLP), with support from Global Fund, has relied on community care sites (*Sites de soins communautaires*; SSCs) to increase access to these services. As of mid-2019, the Global Fund was investing in 5,000 SSCs in 300 health zones. Approximately 38% of the Global Fund supported SSCs also offer a full set of integrated community case management (iCCM) services resulting from an effective partnership with UNICEF and DFID, who supplies commodities for case management of diarrhea and pneumonia. Quantitative analyses indicate these interventions are effective; in an analysis of data from HMIS and PNLP, health zones with SSCs offering iCCM services experienced larger decreases in malaria mortality in children under five than health zones providing case management of malaria only. Still, stakeholders identified a number of implementation challenges including limited ownership by provincial and health zone officials, poor inventory management and delayed funding disbursements from the national to the sub-national levels.

Tuberculosis

Despite increases in TB case notifications in 2018, there were still major gaps in TB case detection, with an estimated 100,000 undiagnosed TB cases and low case identification rates relative to targets. In 2018, three major funders (the Global Fund, The U.S. Agency for International Development (USAID) and Action Damien) signed a memorandum of understanding stating that they would invest in a basic package of TB services in

their respective DPS, including testing and treatment. Stakeholders reported that this partnership was successful: inventory can now easily be transferred between DPS and drug availability improved in 2018. Improvements in case notification rates specifically were in large part attributable to the Global Fund, which invested in an expanded number of facilities providing testing and treatment for TB (*Centre de santé de dépistage et traitement de la tuberculose*; CSDT) and the scale-up of Xpert MDR/RIF testing, including investing in 62 new machines in 2018. Both processes still faced implementation challenges: activities to improve sputum sample transport were delayed and stakeholders reported recurrent cartridge stock outs in some health facilities. The PCE will continue to follow the implementation of TB activities during the final year of the 2018-2020 grant cycle.

Cross-cutting factors

Grant implementation arrangements introduced during the 2018-2020 grant cycle increased operational efficiency in 2019. These arrangements included consolidating HIV and TB activities under a single Principal Recipient (PR), using province-level transversal Sub-recipients (SRs) for all three diseases and mutualizing commodity distribution for all three diseases through Regional Distribution Centers (CDRs), resulting in lower costs for commodity transport and lower unit costs for the procurement and distribution of malaria commodities. The new implementation arrangements, however, also presented challenges: transversal SRs have separate contracts with distinct PRs, with some duplicative activities. During 2019, measures were taken to resolve certain challenges with noted improvement in grant implementation.

In addition, TB/HIV and malaria PRs operate on different time schedules for placing commodity orders and restocking CDRs. To combat these challenges, the Global Fund implemented some interim measures, including authorizing SRs to conduct ad hoc deliveries to avoid stock outs, and PRs discussed the possibility of sharing central warehouses to better synchronize CDR restocking. There were coordination challenges between government and civil society PRs and a lack of communication between stakeholders at the national and subnational levels, leading to misunderstandings about implementation responsibilities. Finally, while stakeholders noted substantial flexibility to revise grants and reallocate funds, revisions were perceived as administratively burdensome and sometimes interfered with implementation continuity.

Resilient and Sustainable Systems for Health (RSSH)

DRC's 2016-2020 National Health Development Plan includes three objectives for HMIS integration and development: (1) improve the completeness, timeliness and quality of data collected, (2) improve analysis and production of health information and (3) improve the distribution of health information. Reporting completeness and timeliness for all three diseases improved dramatically in 2018 and early 2019, but data quality and use are ongoing challenges, especially at the health facility and health zone levels. Barriers to implementation included delays in the approval and integration of catalytic funds in grant agreements, poor internet connectivity, delays in vendor contracting to print and distribute data collection tools, and the use of parallel systems by civil society PRs. Facilitators included the harmonization of the national health pyramid (*pyramide sanitaire*), simplification of reporting tools, implementation of data road maps and successful partnerships between international funders and national disease programs.

Provincial Approach

The provincial approach is a new model for Global Fund engagement at the sub-national level that is intended to give more decision power to the provinces and reinforce decentralization. While some aspects of this approach took effect in 2018, provincial work plans and budgets were still in progress, resulting in stakeholder uncertainty as to how the provincial approach would be operationalized. Much of this uncertainty was resolved in 2019: the Global Fund approved work plans in April and the MoH/CAGF (*Cellule d'Appui et de Gestion financiere du Ministère de la Sante*) issued disbursements to the provincial governments of Maniema and Kinshasa in May.

The PCE also documented a number of "lessons learned" from early implementation that could inform future scale-up, including: (1) provincial governments have not historically been involved in strategic planning and lacked the capacity to propose effective strategies to reinforce health systems. These governments could benefit from technical assistance and reinforcement of provincial dialogues during the upcoming funding request and grant making process; (2) Embedding the provincial approach budget in the malaria/RSSH grant

created confusion among stakeholders who did not understand that the budget was intended to cover all three diseases. The nomination of provincial focal points for each province is expected to improve this process, and a standalone RSSH grant is under consideration for the next grant cycle; (3) Operationalization of the provincial approach budget was very flexible, allowing for timely identification of interventions that were responsive to country needs. Further explanation is included in Table 14.

Select Findings, Recommendations and Strategic Considerations:

	Disease Specific Findings	Recommendations and Strategic Considerations
Malaria	• Stakeholders reported limited disruption of services caused by stockouts of RDTs and ACTs, but some evidence suggests that stockouts had a negative effect on service coverage.	• Stronger systems and indicators are needed to improve stock tracking and monitoring such as a stock-out warning and reporting system, as recommended by the 2019 DRC OIG audit.
	• Addressing operational challenges, such as weak ownership and oversight by both provincial and health zone authorities, health information system challenges and difficulties in the disbursement and processing of funds from the national to the peripheral level could lead to additional gains in malaria community case management.	• Better systems are needed to improve transparency and ensure that funds for supervision, coaching, salary incentives, etc. reach the intended recipients. The mobile money approach that was used in the TierNet pilot project has been promising and could be tested on a pilot scale in other provinces.
HIV	• Cost-effective strategies to improve HIV case notification have been incompletely implemented, resulting in stockouts of first-line HIV tests. • Government co-financing plans included procurement of HIV tests intended for blood donor screening and, while according to preliminary reports, government co-financing commitments were met, information is limited as to whether these commodities were procured.	• The Global Fund CT, PRs and other implementing partners should collaborate to develop a clear and actionable plan to disseminate and reinforce the targeted testing strategy at all levels of the health system, including the use of supportive supervision or other strategies to monitor progress against stated national goals. • The CCM should put into place an effective mechanism to monitor and manage co-financing commitments. o Ensure periodic evaluation (to be specified by stakeholders) on the implementation of country commitments.
	• Distinct testing strategies had conflicting objectives, resulting in differential outcomes. One example is performance-based financing (PBF) for HIV tests, which stakeholders report may reinforce widespread testing of low risk populations.	• At the time of finalizing this report, the PBF indicator was changed to reflect the test positivity rate. It is therefore recommended that the Global Fund monitor how this change in indicator has allowed for better alignment with the new targeted testing strategy. o
TB	• Community activities to search for missing cases have not been implemented as planned and have been delayed due to inability to implement necessary precursory activities, with consequent low absorption of catalytic funds. • GeneXpert machines were deployed as planned, but there are still barriers to implementation, including limited geographic coverage and stockouts of associated commodities.	• Given the successes of the mobile screening strategy, the Global Fund Country Team and PRs should consider the feasibility of smaller units that could be expanded to additional geographies with more difficult access. • The government should continue to advocate with different partners to acquire more GeneXpert machines and their accessories (cartridges) for better geographical coverage. • PNLT should establish a team of trained technicians at the provincial level (to ensure optimal GeneXpert use and maintenance).

	• HIV testing among TB patients is increasing, but not fast enough to keep pace with the rate of increase in new TB cases notified. The One-Stop-Shop strategy is designed to improve HIV testing and treatment in co-infected patients, but the strategy's roll out has been delayed.	• DRC government and partners should improve the coverage of the One-Stop-Shop.
	Crosscutting Findings	**Recommendations and Strategic Considerations**

Grant implementation	• There is some evidence of operational efficiencies achieved through the new grant implementation arrangements, however challenges persist despite stakeholder efforts to resolve bottlenecks:
	  ○ Poor coordination between government and civil society PRs
	  ○ Limited accountability and weak communication at different levels of the health pyramid
	  ○ Weak financial management capacity and non-compliance with financial procedures
	  ○ Shared distribution of health commodities by CDR
		• The PRs should work together on improving the procedures for mutualized distribution. This may include considering shared central warehouses and other solutions for synchronizing schedules for re-stocking CDRs.
		  ○ Global Fund & PR: Harmonizing orders into a single supply line for DRC products at the same time. (At Wambo level)
		  ○ Global Fund should allow buffer stock at all administrative levels: country level (6 months), provincial level (3 months), health zone (1 month).
		  ○ The CDR and DPS (Technical medication group; Groupe Technique Médicament) should improve the joint monitoring of orders and consumption of drugs at the FOSA level (quantification)
		  ○ Provincial health inspector (IPS) should ensure the application of the drug supply responsibility matrix.

Grant revisions	• Frequent grant revisions in DRC appear to be contributing to the effective and efficient use of Global Fund resources, in line with Strategic Objective 1 (SO1) goals, but also impact grant implementation because they are administratively burdensome and often require new budgets and performance frameworks, as well as reorienting stakeholders to new activity plans.	• The Global Fund should consider developing a centralized repository, managed by PRs or CCMs, where key grant revisions are documented and tracked to ensure stronger transparency.
RSSH	• Delayed implementation of HMIS activities, primarily caused by non-completion of procurement activities, resulted in a low rate of absorption for modules related to strengthening the HMIS.	• If possible, the CAG should decentralize for the reproduction of certain (primary) data collection tools at the provincial level and the Global Fund should agree to this adjustment ○ CAG should maintain three-year framework contracts with suppliers (prequalify suppliers to prevent delays) • CAG should use the same distribution channel as health commodities [CDRs] for the distribution of data collection tools

	- Although the national programs have made significant progress regarding completeness and timeliness of reporting in DHIS2, data quality remains poor, and data in DHIS2 are not widely used by implementers.	- The Global Fund should continue investing in strengthening human resources at different levels of the health system to ensure both adequate capacity for data entry, but also for data analysis and use. o Including reinforcement of supervision/coaching by national and provincial technical experts to support the health zones - The Global Fund CT, PRs and technical partners should invest even more in monitoring meetings to improve the quality of these. Condition monitoring costs to improve the quality of these meetings and the quality of data (feedback, meeting methodology).
Provincial approach	- The provincial approach is still in early stages of implementation, but evidence suggests that progress is being made across each of the five objectives.	- As the provincial approach is expanded to other provinces, Technical and Financial Partners should build on existing local capacities and strengthen governance and needs analyses in order to support the new provinces in identifying critical activities to be funded for strengthening the health system, including at the community level. - The Secretary General for health should develop mechanisms to reinforce collaboration and accountability between both structures. In addition, both structures must clearly define the assistance and technical support necessary to strengthen provinces' capacity and engagement in strategic planning, including identification of needs and the development of the provincial strategic plan. - The Global Fund CT should continue to reinforce provincial level dialogues during the next funding cycle and seek opportunities for provinces to define budgets and targets.
	- The PCE identified several lessons from the development and roll-out of the provincial approach that could lead to implementation improvements and expansion of the approach to new provinces.	- Global Fund should continue to support flexible grant mechanisms that allow for provincial level activity programming that is nimble and responsive to province needs. - The Secretary General for Health / CT should include coverage indicators with disaggregated causal analysis for the three diseases, as well as process and system performance indicators, in the contract between the DPS and General Secretariat for Health, monitoring semi-annual feedback from the Global Fund country team.

Chapter 1: Introduction

Background

The Global Fund (GF) Prospective Country Evaluation (PCE), commissioned by the Global Fund's Technical Evaluation Reference Group (TERG), is an independent evaluation of the GF that seeks to understand how GF policies and processes play out in-country. The PCE has been tracking grant implementation progress in the Democratic Republic of the Congo (DRC) since September of 2017 in order to provide high-quality, actionable, and timely information to national program implementers and GF policymakers. The Institute for Health Metrics and Evaluation (IHME) and PATH operate as Global Evaluation Partners (GEP) while the PATH DRC Country Office serves as the Country Evaluation Partner (CEP).

In 2019, based on guidance from the Global Fund TERG, the PCE focused on select topic areas with a greater depth of data collection and analysis through a "deep dive" approach. The PCE worked closely with global and national stakeholders to identify priority topic areas for the "deep dives" based on key criteria:
- Critical component of the results chain being affected by Global Fund investments;
- Information will contribute substantially to understanding of the Global Fund business model and to improvements in programming related to one or more of the six areas of the Global Fund strategy;
- Important issue for country stakeholders and the Global Fund Country Team (CT);
- Data on the issue is available/evaluable

The identified topic areas resulted in several key evaluation questions for malaria community case management and HIV targeted testing, which can be found in Annex 1. In addition, the PCE continued prospectively tracking grant implementation progress for all three disease programs and examining how country contextual factors and the Global Fund business model help or hinder implementation.

Data Collection

The period for data collection and analysis for this report was from January-November 2019. Primary data were collected through meeting observations, key informant interviews (KIIs), and fact-checking interviews (Table 1).

Table 1. Process evaluation data sources

Type	No.	Description: January - November 2019	
Document review	73	• Allocation letter and associated memos • Technical Review Panel (TRP) reviews • Challenging Operating Environment (COE) Manual • Memoranda of Understanding (MOU) • Global Fund Annual Report • Performance-based financing (PBF) manual • PR-SR annual financing agreement • Progress Update/Disbursement Requests (PU/DR)	• Additional Safeguard Policy • Operational Policy Manual • TB PATI 5 management guide • Current grant documents • National strategic plans • Meeting minutes • Global Fund audit • DPS, SR, and CDR contracts
Interviews (Total =53)	25 3 23 2	**National level KIIs**: CCM representatives; Cordaid national leadership; LFA; SANRU national leadership; CAGF; PNLS, PNLT, PNLP; GIZ; UNICEF; DFID; PSSP; RENADEF; PASCO; UCOP+ **National-level fact checking interviews**: SANRU, PNLS, CCM **Subnational-level KIIs**: Cordaid leadership; Antenne SANRU Tshopo; Armée du salut; BDOM; APEC; UWAKI; DPS Maniema; DPS Tshopo; CAMEKIS; Health Zone **Global-level KIIs**: Global Fund Country Team (CT)	
Meeting observations (Total = 33)	2 2 24 5	**CCM**: CCM General Assembly **National programs**: TB program review; Global Fund biannual review **Global Fund CT missions,** including subnational missions for the Provincial Approach **Other**: Medication working group, SR evaluations, CDR security audit, medication commission meeting, National Operational Plan evaluation	

Secondary sources of routine quantitative data were analyzed, including health management information systems, District Health Information System 2 (DHIS2) data, and malaria and TB programmatic data. Financial data included Global Fund grant budgets and Progress Update/Disbursement Requests (PU/DR).

Table 2. Quantitative data sources

Quantitative	Date range	Description
DHIS2	2016 - present	HIV, and malaria indicators from national programs Facility reporting and data completeness
	2018 - present	TB indicators from national program Facility reporting and data completeness
TB program data	2016-2018	TB programmatic data
Malaria program data	2010-2017	Malaria programmatic data
Resource tracking	2011-2020	Global Fund detailed budgets, PU/DR on expenditures

Methods

The PCE's mixed-method approach, detailed in previous reports, includes process mapping; qualitative data analysis; root cause analysis; resource tracking; dashboard visualizations; and output and outcome analysis of routine data. This approach includes triangulation across multiple data sources and an assessment of the quality of the data, which informs the strength of evidence (robustness) rating along a 4-point scale according to the criteria described in Table 3. The ranking helps identify which findings need additional triangulation and validation, particularly if rated as a "3" or below.

Table 3. Strength of evidence (robustness) for process findings on a 4-point scale

Rank	Rationale
1	The finding is supported by multiple data sources (good triangulation) which are generally of strong quality.
2	The finding is supported by multiple data sources (moderate triangulation) of lesser quality, or the finding is supported by fewer data sources of higher quality.
3	The finding is supported by few data sources (limited triangulation) of lesser quality.
4	The finding is supported by very limited evidence (single source) or by incomplete or unreliable evidence. In the context of this prospective evaluation, findings with this ranking may be preliminary or emerging, with active and ongoing data collection to follow up.

Chapter 2: Global Fund Grant Implementation

2.1 Summary of Global Fund investments in DRC and grant absorption trends

The Global Fund is investing over US$580 million between 2018 and 2020 in HIV, TB and malaria in DRC through grants to the Ministry of Health's (MoH) Cellule d'Appui et de Gestion financière (CAGF) and civil society organizations, Cordaid and SANRU. The investment breakdown by Principal Recipient (PR) and disease component are shown in Table 4. Since the original grant budgets were signed in December 2017, additional funds have been made available in 2018 and 2019 through matching funds for catalytic investments (US$15.9 million), portfolio optimization (US$35.2 million), and the debt-to-health agreement between the government of Spain, the DRC and the Global Fund (US$3.4 million).

Table 4. Global Fund investments (US$) during 2018-2020 by PR and disease component

Grant funding source	HIV	TB	HIV/TB	Malaria		TOTAL
	CAGF/PNLS	CAGF/PNLT	Cordaid	CAGF/PNLP	SANRU	
Original grant budget	$22,777,439	$16,186,215	$140,371,747	$71,933,588	$275,717,435	**$526,986,424**
Matching funds	$1,136,085	$2,493,079	$9,370,511	$2,975,025		**$15,974,700**

Portfolio Optimization			$8,700,000	$9,111,692	$17,413,509	**$35,225,201**
Debt-to-health					$3,403,543	**$3,403,543**
Total	**$23,913,524**	**$18,679,294**	**$158,442,258**	**$84,020,305**	**$296,534,487**	**$581,589,868**

*Cellule d'Appui et de Gestion financière (CAGF); National Malaria Control Program (PNLP); National HIV Control Program (PNLS); National TB Control Program (PNLT).

Comparing the first eighteen months of implementation across the five grants, Figure 1 shows that absorption, calculated by dividing the semester budget by the reporting period expenditure, has progressively improved over the first three semesters. Only the Cordaid TB/HIV and MoH malaria grants reported a declining absorption rate in the most recent reporting period. In last year's annual report, we reported that low absorption in the first semester was mainly due to delayed grant start-up, often caused by late signature of sub-recipient (SR) contracts. Despite these progressive improvements in absorption over the first three semesters, cumulative absorption remains moderate for the MoH HIV, TB and malaria grants (56%, 58%, and 53%, respectively). SANRU and Cordaid, which also have the largest grant budgets, have comparatively higher cumulative absorption (68% and 81%) (Figure 2). Cross-cutting drivers of absorption are discussed in further detail in Chapter 4 and in each disease sub-section.

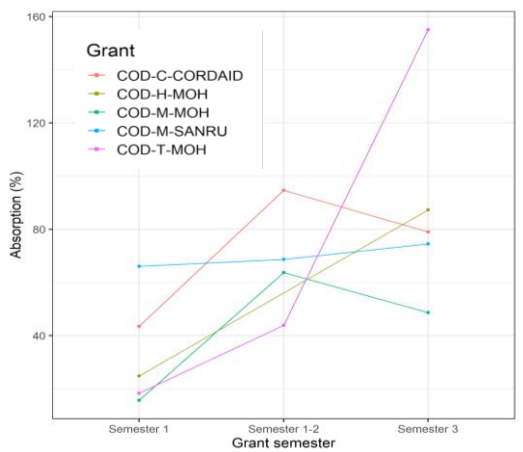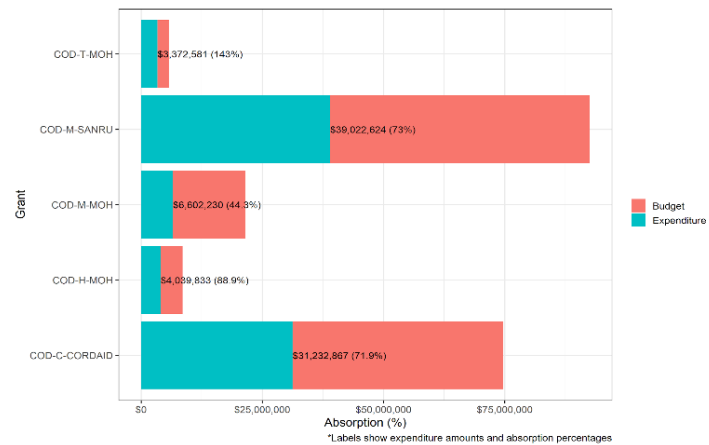**Figure 2. Semester absorption by grant, January 2018 – June (Source: PU/DR)**

Figure 1. Cumulative absorption by grant, January 2018 – June 2019 (Source: PU/DR)

Chapter 3: Contribution to national programs

3.1 Trends in HIV, TB and Malaria Burden of Disease

Though difficult to disentangle, the many activities of the national HIV, TB and malaria control programs are culminating in encouraging progress toward averting new cases and deaths. According to the Global Burden of Disease 2017 study, the HIV incidence rate declined 11.5% per year from 133 to 19 per 100,000 between 2000 and 2017. Over the same time, TB incidence and malaria incidence declined more slowly, from 498 to 438 per 100,000 and from 434 to 294 per 100,000 respectively.(1) The reduction observed for malaria incidence was between 2000 and 2015, however the trend has been increasing since 2016. Mortality declined more rapidly than incidence rates for TB and malaria, but more slowly than incidence rates (albeit still dramatically) for HIV. HIV mortality rates declined from 77 to 21 per 100,000, TB mortality declined from 103 to 66 per 100,000 and malaria mortality rates declined from 202 to 100 per 100,000.(2)

Figure 3. National trends in incidence (left) and mortality (right), DRC[1]
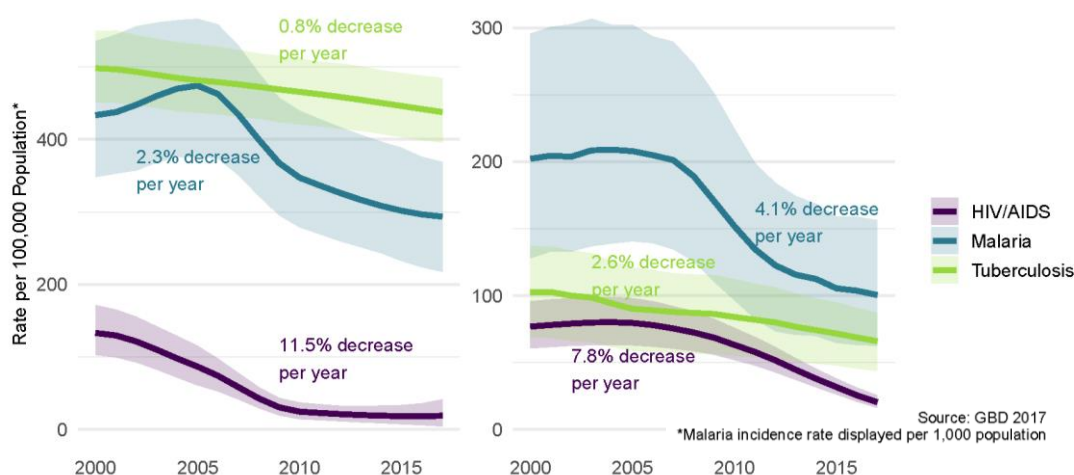
3.2 Malaria

Despite having the second highest burden of malaria globally, DRC has made significant progress in the fight against malaria. Particular success has been achieved through prevention by promoting the use of long-lasting insecticidal nets (LLINs) and extended coverage of basic interventions across all health areas. DRC's malaria program is geographically "rationalized", meaning different funders support different provinces. Nationwide, however, the DRC malaria control effort is centered around LLINs, facility-based treatment and biological confirmation, with additional components for the prevention of malaria in pregnancy and community interventions.(3) Considerable progress has been made in using rapid diagnostic tests (RDT) to confirm suspected cases of malaria, as well as in treating confirmed cases with effective ACTs. Since 2014, the number of RDTs per suspected case of malaria has risen from 0.75 to 0.82 RDTs per suspected case through October 2019, according to national program and HMIS data, while the percentage of confirmed cases treated has risen from 80.0% in 2014 to 93.0% in 2018 and 93.8% so far in 2019.

Despite this progress, one key bottleneck is weak access to and utilization of health services. For example, the 2017-2018 Multiple Indicator Cluster Survey found that over 50% of children with symptoms (e.g. fever) do not seek consultation or treatment.(4) The PCE was able to corroborate this observation by comparing health systems outputs (i.e. medications and tests available in facilities) to population outcomes (estimates of treatment coverage). *(See Annex 4: Health Systems Modelling.)*

Community Case Management

Low utilization of health services may indicate the continued importance of health-seeking behavior (i.e. demand for health services) as a barrier to improving health outcomes, or it may equally indicate the need for greater access to services. One response to both of these issues has been greater investment in malaria case management in the community and in the private sector by the Global Fund, the PNLP and other partners. Integrated management of childhood illness at the community level was adopted by DRC in 2013 and is operationalized through community care sites (SSC). Since 2014, Global Fund has invested in expanding the number of SSCs to improve both accessibility to and utilization of health services. In the current grant, over US$12.4 million was budgeted for activities related to community case management, not including procurement and stocking of RDTs and ACTs. Funding was used for expanding SSC coverage (by establishing 1,462 additional SSCs in seven provinces) and reinforcing community health worker capacity to deliver community case management through supervision from head nurses, and provision of materials and equipment.

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[1] While malaria incidence declined from 2005 to 2015, after 2016 incidence began to increase

Finding 1: The Global Fund has been successful in leveraging partnerships to improve health system integration at the community level and accelerate improvements in malaria outcomes.

Robustness: (ranking = 1) The conclusion is corroborated by multiple data sources, including key informant data and documented evidence.

The Global Fund has partnered with UNICEF to provide integrated community case management (iCCM) at SSCs, whereby Global Fund supports malaria testing with RDTs and treatment with ACTs, and UNICEF supports inputs for treating diarrhea and pneumonia. According to the iCCM Memorandum of Understanding between SANRU and UNICEF, clear differentiation of roles and responsibilities between these two partners have been defined.(5) For example, SANRU, through its Global Fund malaria grant is responsible for the following activities: (i) handling, packing and storing, and transporting inputs received from UNICEF, along with RDTs and ACTs for malaria case management, to SSCs and health facilities; (ii) community distribution of family health kits from UNICEF containing ORS-Zinc, paracetamol, micronutrient powder, and a birthing and newborn care kit; and (iii) ensuring regular reporting on the distribution and utilization of the commodities at SSCs and health facilities. UNICEF provides the financing and procurement of family kits, ORS-zinc, amoxicillin and other commodities for case management of diarrhea and pneumonia in SSCs and health facilities.

The PCE learned that stakeholders involved in delivering these services perceive this partnership to be effective for both delivering malaria case management and integrating them with other essential health services.

Finding 2: Integrated community case management (iCCM) may have contributed to greater reductions in malaria mortality in children under-5.

Robustness: (ranking = 1) The conclusion is corroborated by multiple sources of data, including key informant data and reinforced by quantitative data analyses. KIIs indicate a convergence of opinions across stakeholders and the data were considered of high quality.

As of January 2019, the Global Fund was supporting 3,517 functional SSCs in 300 HZs, covering a population of 6.8 million, for an average person-to-SSC ratio of 1,952:1. The majority of the scale-up of these SSCs occurred from 2014 to 2018. The SSC expansion planned under the current grants would raise the total number of SSCs to 5,068 (person-to-SSC ratio of 1,355:1). Figure 4 shows the proportion of SSCs in each province as of January 2019 that offered the complete iCCM package compared to those offering only malaria case management. According to Global Fund, as of mid-2019, 5,000 sites were operational, including 1,900 offering the complete iCCM package.

Figure 4. SSC coverage in Global Fund provinces and proportion of SSCs offering iCCM as of January 2019 (Labels indicate the total number of functional SSCs in the province)
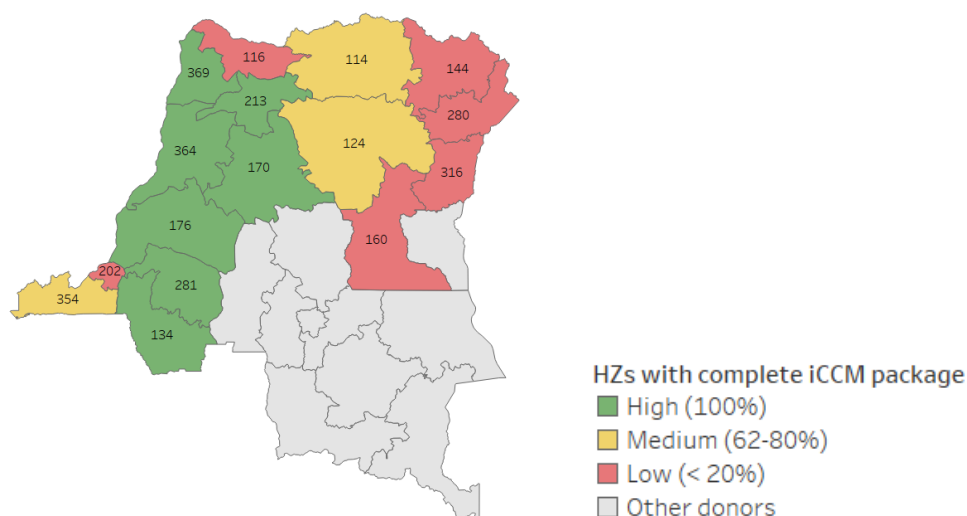
Source: Cartographie des sites de Soins Communautaires (SANRU) 2018-2019

Between 2015 and 2018, we found that under-5 malaria mortality declined faster among HZs with the full package of iCCM services than all other health zones. The PCE analyzed national program data from PNLP over the period of 2010 to 2018, stratified by whether or not health zones offered the full package of iCCM services according to SANRU project documents.

Using difference-in-difference analysis, we identified a statistically significant relationship between HZs that offered the full package of iCCM services and changes in malaria mortality among children (p-value <0.01). While not necessarily robust enough to be a causal conclusion alone, these results provide additional evidence in support of the benefits of iCCM and SSCs supported by the partnership between Global Fund, UNICEF, and other partners. The results suggest that there may be improved outcomes from malaria treatment with additional training for health care workers and treatment of other childhood illnesses that are part of the iCCM package. However, this hypothesis is not yet proven.

Table 5. Improvement in under-5 malaria mortality rate since 2017

| Group	Period	Average Under-5 Malaria Mortality Rate (per 10,000 population) in Health Zones (95% Confidence Interval)
Control	Before 2017	11.8 (11.3-12.2)
	After 2017	7.8 (6.6-9.0)
Intervention	Before 2017	10.1 (9.6-10.6)
	After 2017	3.6 (2.2-4.9)

Source: Programme de Lutte contre le Paludisme (PNLP) 2015-2017; DHIS 2018-present.

Finding 3: More gains in community case management of malaria could be made by addressing operational challenges, such as weak ownership and oversight by both provincial and health zone authorities, health information system challenges and difficulties in the disbursement and processing of funds from the national to the peripheral level.

Robustness: (ranking = 2) The conclusion is corroborated by multiple data sources of good quality data, including key informant interviews, meeting observations, and documented evidence.

Overall, more people are being tested for malaria in DRC, but the number of people being tested at SSCs has remained flat since the initial SSC scale-up between 2014 and 2016.

Figure 5. Number of RDTs completed at health facilities and SSCs

Number of RDTs completed at facilities and at SSCs in DRC
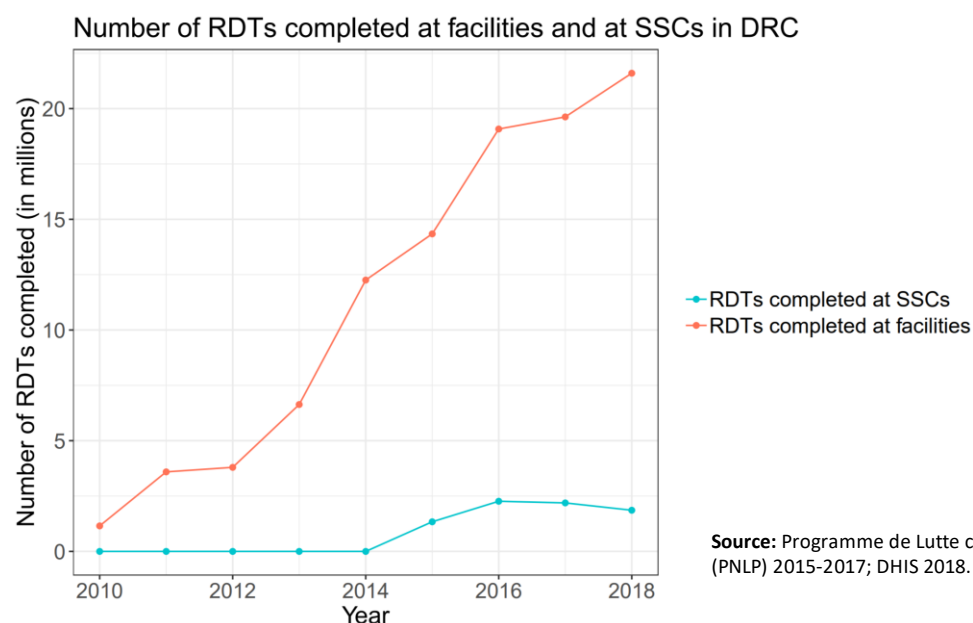
Source: Programme de Lutte contre le Paludisme (PNLP) 2015-2017; DHIS 2018.

Some of the static trend is explained by delays in the planned expansion of the number of SSCs under the current Global Fund grant. Although planned for 2018, installation of additional SSCs was delayed to the first semester of 2019. By the end of the S1 2019 reporting period, a total of 1,039 of the planned 1,462 additional SSCs were installed in five of the seven provinces targeted for expansion. Low absorption of the budget for community-based management of malaria (39.8%) and low overall absorption of the two DRC malaria grants (62.4%) in 2018 resulted from many of the factors discussed in Chapter 2. These included delayed signature

of SR contracts (signed in April and June of 2018) due to the lengthy coordination and alignment of procedures between the malaria and HIV/TB PRs and protracted government procurement processes that stalled the purchase of equipment and materials for the SSCs. Although absorption increased in the first semester of 2019 (66.7%), it remains below target because of delayed implementation of the LLIN campaign and payment of salary incentives.

Aside from the delayed SSC scale-up, challenges operationalizing community case management at SSCs may also contribute to the static trend noted above. The PCE identified three interrelated factors that may be preventing the community case management strategy from realizing its full potential.

1. *Weak ownership and oversight by both provincial and health zone authorities.* Despite trainings conducted with HZ authorities (e.g., ECZS), there is a lack of interest and motivation to take ownership in ensuring high-quality implementation of community case management activities. The root causes, explored in Figure 6, include insufficient resources for supervision (both financial and health worker time) and lower priority due to smaller budget.

2. *Health information system challenges affect stock management and the ability to monitor SSC performance.* Stock management indicators in DHIS2 are insufficient to allow for proper tracking of stock levels to avoid stock-outs. At the end of 2018, PRs reported that data from approximately 23% of SSCs were not yet integrated with health centers' reporting in DHIS2[2]. Unreliable population estimates also contribute to uncertainty and potential underestimation of SSC service populations. The PCE found that SRs must monitor and record stock levels during in-person visits to SSCs, and that SSCs often receive quantities of commodities based on availability at health facilities, not original distribution plans, thus weakening the responsiveness of the supply chain and quality of services.

Figure 6. Root cause analysis of operational challenges in community case management
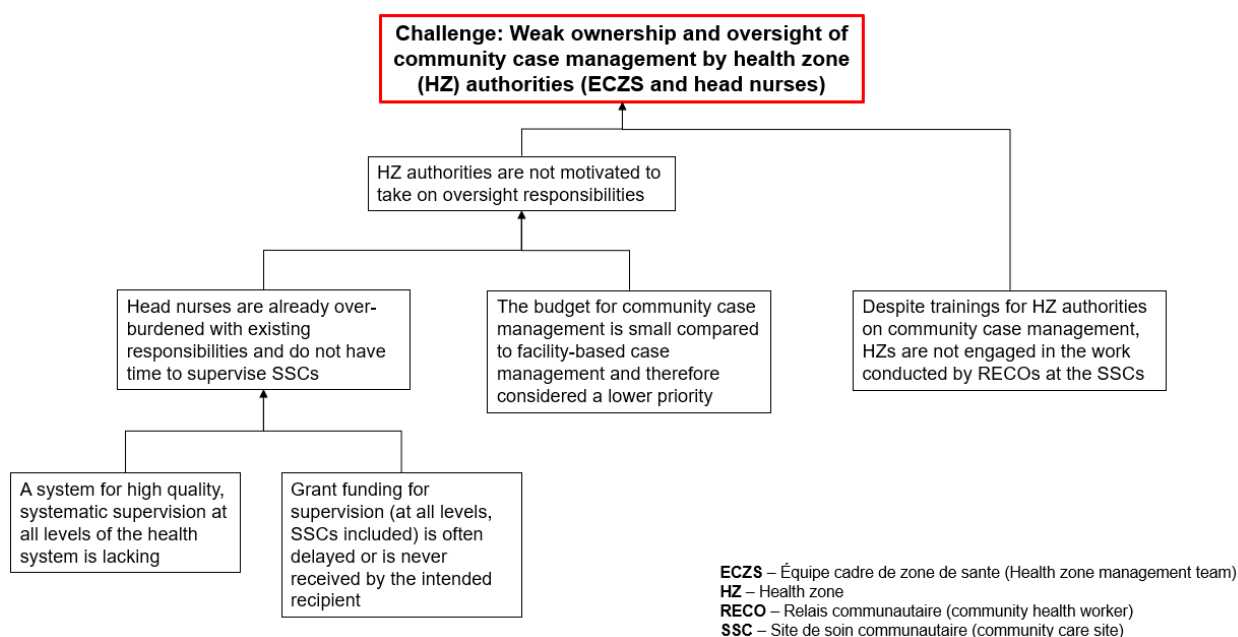
3. *Difficulties in the disbursement and processing of funds from the national to the peripheral level.* Delays and/or non-receipt of funds by the intended recipients have been attributed to systems challenges and weak communication. In NFM2, responsibility for transmitting grant funds from national to subnational implementers was transferred from the civil society SRs to government PRs in the interest of strengthening government ownership and sustainability. The PCE found that parallel lines of reporting for financial versus administrative matters, as well as insufficient communication (at all levels) regarding activities, budgets, and procedures may be creating problems with accountability and lack of sanctioning in the handling of grant funds. Activities implemented at the peripheral level

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[22] Source: COD-M-SANRU S2 2018 PUDR.

were usually the most affected. For example, supervision visits to SSCs by head nurses are irregular because funds are either delayed or are never received. When they are carried out, they are not conducted in a systematic way. The PCE has learned of low utilization of intended supervision checklists due to unavailable materials, and joint visits by SANRU and UNICEF rarely occur due to scheduling conflicts (see section 2.2). Finally, the indicator in DHIS2 for tracking supervision visits to SSCs is not consistently reported, rendering monitoring of supervision impossible. The 2016 Office of Inspector General (OIG) audit recommended developing a plan for a more effective system of supervision but there has been little advancement of this recommendation.(6)

"The sustainability of the approach is uncertain. The Global Fund does a lot in terms of supporting the SSCs, but ownership by the provincial government does not follow. If the Global Fund withdraws today the approach dies." (Quote from a DRC stakeholder)

Facility-Based Case Management

Through both malaria grants, the Global Fund has invested in procurement of essential case management commodities and strengthening the systems for procuring and delivering them. The current 2018-2020 grants budgeted a combined total of US$43.7 million for facility-based treatment, and US$4.4 million in integrated service delivery and quality improvement.

Although these resources appear to be contributing to an improving trend, stockouts of RDTs and ACTs in health facilities remain a common occurrence. According to the S1 2019 PU/DR, approximately 24% of health facilities experienced stockouts of RDTs for at least one day during the reporting period, a marked improvement compared to the 49% of health facilities that experienced stockouts of RDTs in 2018. This trend is reflected in the number of days of stockout experienced by each facility: the average facility reported 7.5 days without RDTs in January 2018, but 6.8 days in March 2019 according to reporting in DHIS (Figure 7).[3] Meanwhile, facility-based surveys including the 2017-2018 Evaluation des Prestations des Services de soins de Santé [Evaluation of Health Care Services] (EPSS), reported that 87% of facilities visited had RDTs in-stock and 80% had ACTs (81% had Artesunate-Amodiaquine (ASAQ) and 15% had Artemether-Lumefantrine (AL)).(7) The 2018 Enquête de Vérification de l'Utilisation finale [Final Use Verification Survey] (EUV), which was conducted in 364 facilities across all 26 DPS between September and November 2018, reported that while fewer than 20% of facilities had stock-outs of RDTs, stock-outs of ACTs remains a challenge.(8) More than one third of facilities had stockouts of AL and one third had stock-outs of ASAQ. Historical data from PNLP also indicate an improving trend in stockouts over time, with an average of 19.9% of facilities having at least one day of stockout of RDTs per month in 2010, but only an average of 10.3% of facilities per month in 2017. Since the adoption of HMIS, reported percentages of facilities with stockouts also show decline over time, but the percentages are overall higher than what were previously reported in the program data, possibly due to lower reporting completeness (see Figure 7).

Figure 7. Percentage of facilities reporting any stockouts, average number of days stocked out of RDTs since 2018

Source: DHIS 2018-present.

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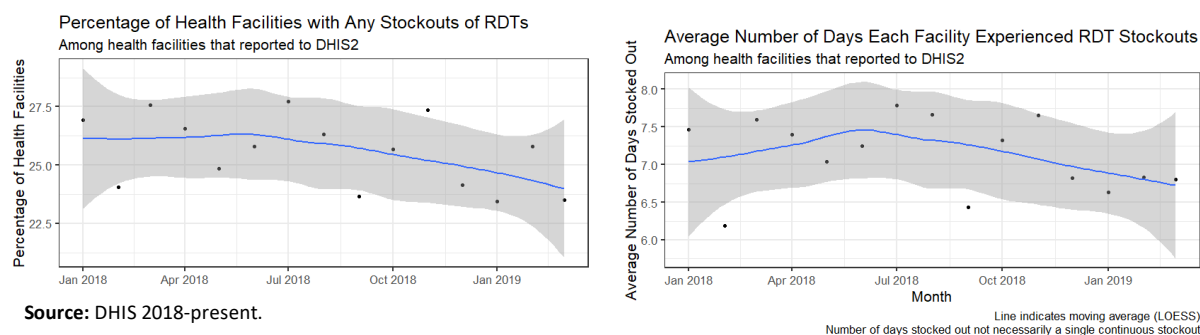
[3] These numbers were analyzed in the context of variable completeness and validity of DHIS2 however (see section 4.2), limiting our ability to understand trends among health facilities that did not record data.

Finding 4: Beyond the improvement in availability of inputs, and although stakeholders have reported limited disruption of services due to stockouts of RDTs and ACTs, some evidence suggests that stockouts had a negative effect on service coverage.

Robustness: (ranking = 1) The conclusion is corroborated by multiple data sources of good quality data, including key informant interviews, meeting observations, documented evidence and reinforced by quantitative data analyses. A strong convergence of opinions is observed between the stakeholders.

As shown in Figure 7 above, national facility-based malaria testing rates have continued to increase despite stockouts. The DRC 2019 OIG audit reported that stockouts in RDTs and ACTs caused minimal disruption of services because health care workers could diagnose using microscopy and substitute second-line antimalarial medications when necessary.(9) Grant performance indicators also seem to suggest satisfactory performance of testing and treatment indicators. According to the S1 2019 PU/DR, 94% of suspected malaria cases were tested and 95% of confirmed cases received first-line antimalarial treatment.

"For malaria, commodity stockouts barely affected the diagnosis and treatment of cases due to microscopy testing being used instead of Rapid Diagnostic Tests (RDTs), and there were few instances of simultaneous stockouts of all forms of antimalarial tablets." (Quote from a DRC stakeholder)

However, PCE analysis of DHIS2 data suggests that there may actually be evidence of disruptions. Among facilities that reported any RDT stockouts in a particular month since 2017, a slightly lower percentage (35% vs. 39%) of suspected cases (450,092 vs. 1,392,312 suspected cases) have been confirmed. Similarly, a slightly higher percentage of unconfirmed cases were presumptively treated (0.02% vs. 0.006%). Although in percentage terms, presumptive treatment may seem low, these equate to an average of 100 patients presumptively treated per facility-month by facilities which did report stockouts, and 78 patients presumptively treated per facility-month by those which did not.

It is worth noting that a large number of facilities failed to report whether or not they experienced stockouts. If these facilities are assumed to have had no stockouts, the above evidence points much more strongly towards disruptions in services: 61% of suspected cases in these facilities were confirmed (as compared to 35% above), and an average of 61 patients in these facilities were presumptively treated per month (as compared to 100).

This analysis is not necessarily conclusive about disruption of services. Not only is there a high degree of missing data about stockouts, but confounding factors (such as geographical access) may explain the correlation between stockouts and service delivery. On the other hand, even if services have continued

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Efficiency and Effectiveness Estimates from Health Systems Modelling

The PCE applied a technique known as Health Systems Modelling (HSM) to further understand the process by which Global Fund and other resources translate into changes in health outcomes. Annex 4 provides methodological details. Among other applications (many of which already cited in this report), this form of model can be used to understand the efficiency and effectiveness of key health services delivered through the grants.

Regarding efficiency, HSM provides a new estimate of the end-to-end cost of delivering commodities above simply the procurement cost. For example, using multiple data sources on inputs and outputs, this approach estimates that it cost US$9.95 on average (95% uncertainty interval: US$5.68-US$40.12) to procure and ship one LLIN during the period 2010-2018. The model similarly estimates an average cost of US$3.04 (95% uncertainty interval: US$1.73-US$12.83) per RDT, and US$1.56 (95% uncertainty interval: US$0.88-US$6.74) per ACT procured and shipped.

Regarding effectiveness, this approach estimates that for every ten additional LLINs distributed to households, an additional 3.95 (95% uncertainty interval: 1.74-6.17) persons have consequently reported sleeping under LLINs the previous night. These estimates are based on a combination of data from PNLP, SNIS and survey-based model estimates of LLIN coverage from the Malaria Atlas Project.

Although these estimates do have limitations (see Annex 4), they could have practical utility for budgeting during the next funding request, as well as setting realistic targets for grant implementation.

through the use of microscopy and second-line medications, the quality of services (e.g. wait times, cost of services, effective treatment rates) may have suffered as a result. The extent to which stockouts are a barrier to service coverage should continue to be monitored to better understand ways to improve service delivery.

3.3 HIV/AIDS: HIV testing and high-risk populations

With an estimated 92% of diagnosed PLHIV enrolled on ART, DRC has surpassed the second of the 90-90-90 goals. Case identification, however, is low relative to the "first 90": only 62% of PLHIV knew their HIV status in 2018.(10) As a result of this limited progress, PNLS finalized a new National Strategic Response Plan (NSRP) for HIV in April 2018 that represents a transition from voluntary counseling and testing (VCT) for the general population to provider-initiated testing and counseling (PITC) based on risk behaviors and self-identification of key and priority populations. The new strategy was also motivated by a lack of availability of HIV tests and low testing yields: in 2018, several provinces reported 0% quarterly test positivity rates[4] in health facilities.(11) Here, we explore sub-national implementation of the new testing strategy, barriers to achieving case identification targets, and the effectiveness of early implementation of the strategy using quantitative and qualitative data.

Priority DPS and the rationalization process

As a result of the 2015/16 Rationalization Process, the Global Fund supports 354 health zones in 23 DPS, including 14 health zones within Kinshasa DPS, while PEPFAR concentrates on 52 health zones in the two highest prevalence DPS, Lualabala and Haut-Katanga, located on the borders of Zambia and Angola, as well as military sites nationwide. PEPFAR also transitioned away from procuring PMTCT commodities; donors now invest in all HIV-related commodities for their associated DPS and health zones regardless of service type.(12) In addition, PNLS identified 16 priority DPS for differentiated care and service delivery models as a part of its stratified response to HIV. These DPS were selected based on HIV prevalence, the presence of key populations, ART enrollment, and TB/HIV co-infection rates and include nine high-priority and seven medium-priority provinces. Among the 24 DPS supported by the Global Fund, PNLS classifies 14 as high or medium priority.

Financial allocation for HIV testing

The current HIV grants approved in December 2017 do not have a module specific to HIV targeted testing, making it difficult to track total allocation and expenditure for HIV testing over time. However, testing interventions listed at the activity level include: organizing evening mobile testing for men who have sex with men (MSM), transgender sex workers and people who inject drugs (PWIDs; $658,442) and training healthcare providers to assist PWIDs ($11,454.60). The revised January 2019 CORDAID budget also includes specific interventions for testing key populations, including HIV testing services for MSM ($91,350), CSWs ($480), transgender people ($113,476) and PWIDs ($21,600).

The US$480 for testing CSWs, however, is artificially low: after the submission of the S1 2018 Cordaid PU/DR, Global Fund representatives noticed poor performance around the indicator "KP-3c(M): Percentage of sex workers who received a HIV test in the reporting period and received their results." As a result, funds were reallocated to cover key testing activities for CSWs, including mobile testing, such that Cordaid was able to shift funds and spend US$29,482 on HIV testing for CSWs in S1 of 2019.[5] Along with the approved budget allocation, the first procurement of rapid tests under the Cordaid HIV grant occurred on May 15, 2018 and included over one million first line tests at a total expenditure of US$828,864.(13)

Table 6. Procurement of HIV tests in DRC, 2018-2020 grants

HIV Test	Units purchased	Total cost (US$)	Mean unit cost(US$)
Determine (first line)	1,003,040	$828,864	$0.83
VIKIA (second line)	45,600	$39,398	$0.86
Uni-Gold (third line)	69,920	$111,872	$1.60
Total	**1,118,560**	**$980,134**	**$0.87**

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[4] The draft manual does not specify the number of provinces or health facilities with 0% test positivity rates.
[5] Cordaid Progress Update and Disbursement Request (PU/DR), S1 2019. Internal document.

Cordaid also reported the following 2018–2020 procurement schedule for HIV tests:

Table 7. Cordaid procurement schedule for HIV tests, 2018 – 2020 grant cycle

Year	Target	Unit Cost	Quantity Purchased	Factory Cost	Purchase Cost
2018	2,301,146	$0.80	2,500,000	$2,024,960	$3,299,793
2019	2,510,024	$0.80	2,761,000	$2,208,800	$3,599,972
2020	2,734,430	$0.80	2,406,240	$2,406,240	$3,921,112
Total	**7,545,600**	**-**	**7,667,240**	**$6,640,000**	**10,820,877**

This procurement schedule will likely change slightly, as Cordaid reports that the vendor for VIKIA (second line) is closing, which may affect the testing algorithm. The PCE will follow up on changes in the testing algorithm, as well as the effect of differential unit costs (Table 6) in 2020. Stakeholders also reported that, due to an insufficient number of HIV tests relative to need in 2018, Cordaid conducted an additional procurement process in 2019 to cover the gap in available HIV tests (discussed below).

Absorption (expenditure as a percentage of budget allocation)

Absorption of funds for targeted HIV testing among transgender people (10.6%), PWIDs (0%), and MSM (9.1%) in the Cordaid HIV grant was low in the first semester (S1) of 2018 but increased substantially by the time the annual PU/DR was submitted (for the 2018 reporting period), increasing to 152.1% absorption for HIV testing among transgender people and 66.1% for PWIDs. Spending on HIV testing for CSWs and their clients, however, remained minimal (11.7%) until additional funds were added to the intervention category in 2019, resulting in over 6,000% absorption relative to the original budget allocation. According to national HMIS data, HIV tests among CSWs also increased during this period.

As explained further in Chapter 4, low absorption during S1 2018 was the result of a number of factors, including lengthy coordination between Cordaid and SANRU leading to approval delays for 2019 SR activity plans and delayed disbursement of SR funds. In addition, the HIV/TB and malaria PRs each work with one transversal SR per DPS, requiring substantial ongoing collaboration. Along with these coordination processes, financial procedures, such as expenditure justification, are not well understood by stakeholders. Stakeholders often need to re-submit expenditures for approval, resulting in an additional administrative burden and reimbursement delays.

Targeted Testing Strategy

Developed in 2018 and finalized in February 2019, DRC's new targeted testing strategy was based on World Health Organization (WHO) guidelines, previously implemented in PEPFAR supported provinces,[6] that encourage provider-initiated testing and counseling (PITC) using a screening tool that identifies high-risk behaviors for HIV transmission.(12) The strategy differentiates between two groups of PITC-eligible patients. Patients who self-identify as MSM, PWIDs, CSWs, transgender people, incarcerated persons, miners, truckers or traveling salespeople should be "systematically" tested for HIV, receiving a provider-initiated HIV test at every visit regardless of reported risk behavior. Patients with a higher likelihood of being HIV-positive due to comorbidities, including patients who are TB-positive, malnourished, hospitalized with signs and symptoms of HIV or who test positive for other sexually transmitted infections (STIs), should also be systematically tested.

If a patient is not clinically eligible or does not self-identify as a member of these key and vulnerable groups, the provider should then deliver a risk factor screening questionnaire ("*Have you had multiple sexual partners in the last twelve months?*") to determine eligibility for PITC (called "targeted" testing). Patients who do not qualify for PITC under the identity and risk criteria remain eligible for voluntary testing, but providers will not recommend HIV testing as a component of routine care. This screening process is expected to result in higher

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[6] While PEPFAR's 2018 testing strategy is outside of the scope of the PCE, the strategy can be summarized as follows: *"Ambitious targets have been set to find additional positives thorough aggressive strategies, with a special emphasis on Kinshasa. The proportion of the budget based on HVCT targets doubled in COP 2017 to accommodate the ambitious targets. Testing targets were calculated from treatment targets resulting in the need for 1,345,443 individuals tested to yield 41,189 positives… It is anticipated that 80 percent of these positives will be recruited through facility-based modalities while 20 percent will come from community-based modalities (mostly index and mobile)."*

testing yields of notified cases relative to HIV tests performed, increasing the cost effectiveness of HIV testing in low prevalence areas.(11)

In addition to the updated clinical guidelines, The 2018-2021 NSRP for HIV aims to strengthen community-based testing, targeted testing in health care settings and testing for exposed children, with an emphasis on the following priority groups (with NSRP reasoning) (14):

- HIV/TB co-infected patients, as only an estimated 25% of TB patients were screened for HIV;
- Key populations with high relative prevalence: CSWs (3.4%), MSM (3.3%), and PWIDs (5.9%)[7];
- Children and adolescents 10 – 19 years, as they represent 12% of all PLHIV;
- Orphans and vulnerable children, as they exhibit high risk behaviors for HIV transmission;
- Uniformed personnel, as they have an estimated 3.6% prevalence (6.4% among prison guards);
- Pregnant women, specifically to reduce mother-to-child-transmission (MTCT);
- Refugees and internally displaced persons (IDPs)

Under HIV testing, the NSRP lists Objective 4.1.2: 90% of PLHIV are detected (an estimated 481,011 PLHIV), with the following coverage targets suggested for 2018 - 2021[8]:

Table 8. Coverage targets for HIV testing, 2018 – 2021 NSRP

Performance Indicator*	Baseline Value (%)	Baseline Year	Target (%)			
			2018	2019	2020	2021
% of the population aged 20-49 tested for HIV	8.5	2014	30	50	70	90
% of CSWs tested for HIV	45.7	2015	54	63	71	80
% of MSM tested for HIV	7.8	2013	26	44	62	80
% of adolescents tested for HIV	No data	-	20	43	67	80
% of PLHIV tested for HIV	54.7	2017	64	73	82	90

*All testing indicators include "and know their results."

Finding 5: Cost-effective strategies to improve HIV case notification have been incompletely implemented, resulting in greater than anticipated use of HIV tests and accompanying stockouts of first-line HIV tests.
Robustness: (ranking = 1) The conclusion is corroborated by multiple sources of data, including key informant data and documented evidence (Targeted testing manual). KIIs indicate a convergence of opinions across stakeholders and the data were considered of high quality.

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[7] New data on HIV prevalence among key populations indicates : CSWs (3.4%), MSM (3.3%), and PWIDs (5.9%) was made available after this report was written.

[8] Targets and baseline values are from the 2018 – 2021 National Strategic Response Plan for HIV, which cites sources for baseline values but does not discuss target setting in detail. These sources include the Global AIDS Response Progress Reporting from UNAIDS (for key population indicators) and, for the proportion of adults 20 – 49 who were tested for HIV, the 2013/14 Demographic and Health Survey (DHS).

While the new HIV testing strategy is widely accepted by national stakeholders, it has not been widely disseminated to health facilities in Global Fund-supported provinces, resulting in a lack of risk-based PITC and low testing yields. In addition, health facilities continue to use HIV tests designated for risk-based PITC for voluntary and provider-initiated testing of people at a low risk for HIV, resulting in persistent stock outs of first line HIV tests.

> **HIV testing for pregnant women**
>
> In order to eliminate mother-to-child-transmission (MTCT), the NSRP calls for 100% of pregnant women living with HIV (an estimated 76,211 women) to know their HIV status by 2021. However, it also notes that only 45% of health facilities had implemented PMTCT activities at the time of writing, and only 27% of pregnant women were aware of their HIV status, in 2015. Unfortunately, gains since then have been small: 2018 HMIS data indicate that only 23.6% of pregnant and lactating women were tested for HIV in Global Fund-supported health zones in 2018. This percentage, however, varied by region: only 11.9% of pregnant and lactating women in Equateur were tested for HIV, compared to over 30% tested in Tshopo, Sud Kivu, Kwango, Haut Lomami, and Kongo Central. 2019 PU/DRs showed some improvements in HIV testing among pregnant women, with the MoH reporting that 37.6% of pregnant women knew their HIV status by S1 of this year. The Global Fund Performance Framework set targets of 39% in 2018 and 44% in 2019, for achievement ratios of 95% and 85% respectively.

Stockouts of HIV test kits

During the 2018-2019 assessment period, the PCE found that persistent stock outs of HIV test kits at health facilities undermined testing coverage**.** As reported in the S1 2019 PU/DR, 240 health facilities of 3,578 (6.7%) reported experiencing a stockout of HIV rapid tests, which is higher than the acceptable threshold of 71 health facilities. However, there was also a clear improvement in the availability of all three HIV rapid tests in the testing algorithm during the first three reporting periods, declining from 23% of facilities experiencing a stock out in S1 of 2018 to 16% in S2 and to 6.7% in S1 of 2019.

The July 2019 the OIG audit report also found that, while ART was continuously available at all health facilities visited (n = 55 across six DPS), 67% experienced recurrent stock outs of HIV test kits that lasted an average of one month. As a result of these stock outs, an estimated 2,314 HIV-positive pregnant women (27% of all pregnant women presenting for antenatal care at the 55 facilities in 2018) did not receive an HIV test.(9) The report attributed this problem to lack of implementation of the targeted testing strategy, stating that *"HIV test kits procured under the Global Fund grant are aimed at key populations and populations at risk… while health facilities extend HIV testing to the general population."* (9)

The PCE explored potential causes of these stock outs in a 2019 Root Cause Analysis (RCA). In addition to lack of implementation of the new strategy, other factors that arose were:

- Weak supply chain management, including poor inventory quantification at health facilities;
- Staff shortages, particularly for pharmacists and pharmacy technicians, who are able to guide distribution plans and manage inventory;
- Use of test kits by healthcare workers for other purposes, such as blood donor screening;
- Performance-based financing for HIV testing; and
- The distribution of HIV tests to facilities in health areas that are not supported by Global Fund.

"Well targeted testing [will help] to improve the first 90, but we must also identify other mechanisms to avoid stock outs." (Quote from a DRC stakeholder)

Barriers to implementation: lack of available data for performance indicators

The lack of available data is a consistent challenge for target setting and implementation in DRC, with no population representative estimates available for key populations.(12) However, the 2013/14 Integrated Bio-Behavioral Survey (IBBS), which surveyed 12,207 street children, miners, truckers, and CSWs in eleven cities

and provincial capitals, provides the best available information on sexual behavior, HIV testing, and prevalence. HIV prevalence among all four key populations was high relative to the general population (2013: 0.6%; Table 8).(15) Of these four groups, CSWs had the highest HIV prevalence (6.9%), although they were also the most likely to have ever received an HIV test (Table 9).

Table 9. IBBS results by key population surveyed, 2013

Population	Sample size			Ever had an HIV test (%)			HIV prevalence (%)			
	Male	Female	Total	Male	Female	Total	Male	Female	Total	95% CI
Street children	1,465	782	2,247	13.8	17.5	15.1	0.3	4.3	1.6	1.0 - 2.2
Miners	1,335	-	1,335	28.9	-	28.9	1.8	-	1.8	1.1 - 2.5
Truckers	2,077	-	2,077	39.2	-	39.2	1.2	-	1.2	0.7 - 1.7
CSWs	-	6,458	6,548	-	66.5	66.5	-	6.9	6.9	6.3 - 7.5

The 2013/14 IBBS did not interview any female miners or truckers or any male commercial sex workers

HIV prevalence was also highly variable by DPS, with prevalence estimates for CSWs as high as 14.2% in Mbuji-Mayi, 10.7% in Lubumbashi and 9.8% in Kinshasa. The percentage of key populations who had ever received an HIV test also varied by region: 24.8% of street children in Kinshasa had ever been tested compared 8.6% in Kisangani and 9.4% in Mbuji-Mayi. For CSWs, 66.5% had ever had an HIV test compared to 32% in Kisangani. Large demographic shifts in the past six years, however, have likely affected these estimates, and no estimates are available of population size.

As a result of limited data on key populations, the Global Fund supported a follow-up IBBS that initiated data collection in 2016, with results anticipated in late 2019. Data were not available at the time of writing; however, the PCE has requested the summary report and will update findings once the results are received. These estimates have the potential to provide critical information to identify gaps in testing coverage.

In S2 2018, the Global Fund required PRs for all three diseases to report on Global Fund performance indicators using DHIS2. While the PRs complied with this requirement, program staff did not consider DHIS2 data sufficiently reliable for a number of indicators, especially for key populations, due to concerns about the timeliness of reporting, accuracy of values and a lack of data entry training for clinical and public health staff. PNLS in particular continues to rely on separately collected routine data to measure progress towards testing coverage. Here, we compare reported results from PNLS with DHIS2 estimates whenever possible in order to illustrate both the variability in surveillance estimates by data source and all available evidence for indicator performance. This issue is discussed in more detail in Chapter 4.

Barriers to implementation: co-financing and blood donor screening

On 9 January 2018, the Government of DRC committed US$98,864,223 in co-financing for the HIV, TB and malaria programs. While documentation of co-financing was not stratified by intervention, the co-financing allocation includes a commodity procurement for The National Blood Transfusion Program (*Programme National de Transfusion Sanguine;* PNTS), including HIV tests intended for blood donor screening. Preliminary reports to the Global Fund indicate that, from January-December 2018, the government spent US$133.9 million in co-financing, exceeding its commitment for the three year grant period[9].(16) However, there is some confusion as to whether these commodities were procured.

In addition, a number of stakeholders cited rapid HIV testing for potential blood donors as a major cause of stock outs of first line HIV tests at health facilities. While reliable quantitative data on HIV tests performed as a screening mechanism for blood donors were not available at the time of writing, two findings support this possibility. First, the NSRP sets ambitious targets for blood donor screening, including the reduction of blood-borne HIV transmission from 1.3% in 2015 to less than 1% by 2021. This goal includes increasing screening of volunteer blood donors from 32% to 52%. Second, in the 2019 LFA Report on Use of HIV Test Kits, the LFA reports visiting one health center and three general referral hospitals, in which 61.6% of HIV tests were used for blood donor screening (range: 38.25-80.2%).(17) While this finding does not account for the very large

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[9] Preliminary report on public expenses. Submitted to the Global Fund on 3 August 2019, in response to a Global Fund letter to the Minister of Health on 16 July 2019. Internal documents.

number of small health facilities in DRC (including many without a physical building[10]) that are unlikely to offer transfusion services, it is worth noting as a possible underlying cause of the lack of consistent available of HIV tests.(14)

Finding 6: Where implemented, community outreach activities successfully improve HIV testing coverage for key and priority groups.

Robustness: (ranking = 2) The conclusion is corroborated by few data sources and is mainly based on KII evidence which is deemed to be of good quality given the proximity of key informants to this topic.

The HIV/TB Funding Request includes the following prioritized activities to improve testing coverage among high-risk populations:

- HIV testing at events organized by networks of MSM, transgender people, CSWs and PWIDs;
- Issuing a ministerial order asking care providers to offer HIV tests to groups at risk for HIV;
- Renovating and supplying "user friendly centers" for MSM and other key populations;
- Promoting counseling and testing for adolescents and youth;

Mobile testing. These strategies were implemented in seven provinces including, Bunia, Kasai Oriental, Kinshasa, Kongo Central, North Kivu, South Kivu and Tshopo). Stakeholders reported positive results from the strategies during early implementation. Initial analyses of HMIS data on key populations also indicated high testing yields, with high test positivity rates reported among CSWs, MSM and PWIDs. 2019 PUDRs also cite community outreach activities as sources of improvement in testing coverage. For example, the CORDAID S1 2019 PUDR states that 4,185 PWIDs were tested in 2019 (120% of grant target). Similarly, high achievement ratios were reported for CSWs (95%; n = 17,466 tests performed) and MSM (109%; n = 11,511 tests performed). These high achievement ratios were attributed to a number of community outreach and key population oriented strategies, including the use of "user friendly" HIV testing centers, compliance with the new testing strategy in health facilities, mobile testing units, "red light district" targeting, index case testing and peer referral networks.

"The targeted testing strategy works well; we targeted the appropriate sites of key pops; we go where they work." (Quote from a DRC stakeholder)

PEPFAR also described successes with community outreach activities: *"FY2017 Q1 data provided meaningful evidence showing that scaling up of community index and mobile testing has the potential to reach specific populations (adolescents, men, key populations) that do not appear to be effectively served by PITC. Task-shifting now allows for peer educators to conduct testing, rendering this modality more feasible."*(12) Some SRs also noted that receiving vehicles to reach remote areas in three DPS (Kongo Central, North Kivu, and South Kivu) allowed them to improve monitoring and support both "user friendly" health centers and mobile clinics oriented towards CSWs.

Finding 7: Distinct testing strategies had conflicting objectives, resulting in differential outcomes. One example is performance-based financing (PBF) for HIV tests, which stakeholders report may reinforce widespread testing of low risk populations.

Robustness: (ranking = 3) The conclusion is corroborated by few data sources and is mainly based on KII evidence which is deemed to be of good quality given the proximity of key informants to this topic.

In order to improve progress towards the 2015 Millennium Development Goals (MDGs), DRC included performance-based financing (PBF) as a strategy in its *2011–2015 National Development Plan*, with implementation in thirteen DPS.(18) PBF incentives in these provinces were designed to improve treatment quality, increase the number of patients receiving services and supplement provider salaries by providing payments to healthcare workers based on service delivery for a package of interventions including outpatient consultation, pre- and post-natal visits, minor surgical procedures, and HIV testing. Financing is scheduled to continue through 2020, with the possibility of extension.

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[10] The NRSP notes that 88% of health facilities in DRC do not have an associated "physical structure."

Because the majority of health facilities providing HIV testing were integrated into the HMIS in 2018 and PBF was initiated in 2011, it is difficult to track changes in HIV testing relative to previous performance. However, stakeholders reported that they believe compensation for performing HIV tests may be acting as a "perverse incentive," encouraging healthcare workers to perform HIV tests on patients regardless of risk. As a result, facilities implementing PBF are experiencing test kits shortages and low case identification rates:

"PBF promotes the consumption of tests even without positive results. We should see how to change this indicator from number of people tested to number of positive cases." (Quote from a DRC stakeholder)

There was widespread agreement among stakeholders that the health system needs to incorporate case identification and test positivity rates into the PBF incentive process, moving away from the reliance on the number of HIV tests performed. At the time of writing, the testing indicator was modified from number of people tested to the number of people with positive HIV tests, which is expected to facilitate applications of the testing strategy that increase the likelihood of case finding per test performed.

3.4 TB grant

DRC is among the 30 countries designated by WHO as high-burden for TB, multidrug-resistant TB (MDR-TB), and HIV/TB co-infection. An estimated 270,000 people developed TB in DRC in 2018. Just over 171,000 people with active TB were notified to the national TB program (PNLT) in 2018, leaving an estimated case detection gap of approximately 100,000 people.(19) Narrowing the case detection gap is a key objective of the current TB grant. Members of key populations who are disproportionately affected by TB and prioritized for active case finding include prisoners and staff working in prisons, men in uniform (police and military), miners and people living in settlements around mines, persons displaced by tribal conflicts and/or armed refugees, and persons with diabetes. A large case detection gap exists for children with TB. In 2018, DRC reported 19,802 children with TB, which is just over half of the estimated TB cases occurring in children. Other priority considerations in DRC include MDR-TB, which occurs in approximately 1.7% of persons with an initial TB infection and 9.7% of persons with previously treated TB.(20) Improving outcomes among persons with TB-HIV co-infection, 14% of persons with TB infection, is also a priority.

TB funding landscape and Global Fund

Different donors fund routine activities by DPS, with 18 DPS covered by the Global Fund, 9 covered by USAID and 11 by Action Damien at the beginning of 2018. In certain DPS, there are still two funding partners. In the interest of increasing geographical coverage, reducing duplication of TB interventions, and to optimize coordination of activities, Global Fund, USAID, Damien Foundation and PNLT signed a memorandum of understanding. This partnership laid the foundation for each donor to provide a basic package of services in their respective DPS and agree on practical and financial support. Evidence indicates this partnership has been successful and the three partners have worked synergistically to meet the needs of the country. Results of this partnership include availability of drugs, easily transferring stock between DPS based on stock needs, and the guaranteed transportation of inputs to facilities. While this partnership has been effective throughout the implementation phase, accountability is not clearly defined and compliance with certain clauses in the memorandum was not respected. For example, the memorandum mandates that PNLT centralizes the management of drugs and laboratory inputs and makes them available in all DPS. However, not all funders adhere to this provision and PNLT has difficulty using their leadership role to effectively manage the stock of TB drugs nation-wide.

TB case notification and capacity for TB case detection are increasing with Global Fund support, but a large case detection gap remains. The main indicator used to measure success of the End TB strategy is the number of new cases and relapses reported. The goal in 2018 was to notify 163,900 cases; 200,000 cases in 2019; and 266,900 in 2020. While there was a 15% increase in reported cases between 2017 (151,832 cases) and 2018 (178,682 cases), the detection rate remains low compared the 2019 goal of 200,000 cases. Based on the satisfactory 2018 performance, the notification targets for 2019 and 2020 were increased by about 15% and accompanied by a new quantification of first-line drugs to meet the revised targets.(21)

Figure 8. Notified TB cases, all forms (2017-2018)

Source: PNLT; data are quarterly
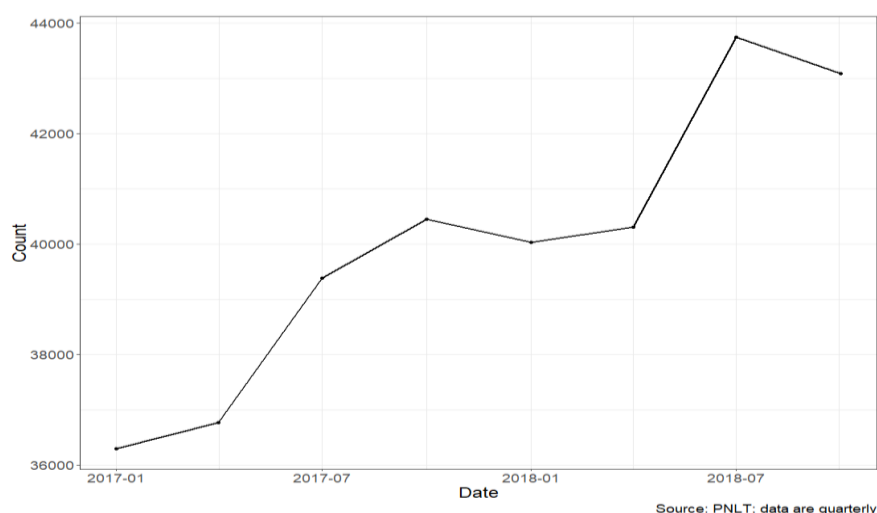
The trend toward increased TB case detection continued into early 2019 with 86,866 new or relapsed cases of TB reported during the first two quarters of 2019. This represents an achievement of 105% of the 82,994 target for notified TB cases. This achievement was credited in part to an increase in the number of health facilities providing diagnostic testing and treatment for TB (CSDT) from 1,740 in 2016 to 1,976 in 2018. The Global Fund, in partnership with other funders, provided funding for this expansion of CSDT.

Mobile testing units

Beyond the expansion of CSDT, the use of mobile testing clinics in Kinshasa, Kongo Central, Kwango and Kwilu also contributed to an increase in the number of persons with TB detected. The PNLT has four mobile units that began testing people in four cities during Q4 2018 and Q1 2019. The mobile testing unit includes a lab, digital x-ray, and GeneXpert machine that provide results in less than two hours. Initial results from the mobile testing units are promising. In the four cities, among the 83 cases anticipated, 126 new cases were found, representing 152% of the target. The PNLT would like to expand the use of the mobile testing units, although poor road quality may leave many areas of the country inaccessible to these mobile units.

Finding 8: Community activities to search for missing cases have not been implemented as planned and have been delayed due to inability to implement necessary precursory activities, with consequent low absorption of catalytic funds.
Robustness: (ranking = 2) The finding is corroborated by multiple data sources, including key informants and documented evidence and the data is considered to be of good quality given the proximity of key informants to this topic.

In spite of recent gains, substantial challenges remain in improving TB case detection. Catalytic funds of US$2.5 million were intended to fund interventions related to active case finding, including screening and diagnosis, community management of tuberculosis, joint TB and HIV control interventions, and screening and diagnosis of MDR-TB. However, before these activities could be implemented a certain number of precursory activities had to be completed but were either delayed or not adequately implemented. These included:

- Training community health workers responsible for raising awareness and searching for persons with TB;
- Implementation of the proposed sputum sample transport strategy; and
- Organizing transportation of sputum samples from communities to health facilities.

The current grant budget has funds allocated for the transport of samples. Roll out of the national sample transport system pilot only began on 31 December 2018 in Kongo Central DPS. A consultant was hired to assist CPLT in replicating this experience at the national level and in April 2019 there was a workshop with the priority CPLTs to work on updating each of their sample transport strategies, but it was only as of September 2019 that the CPLT Kinshasa started this activity.

Finding 9: GeneXpert machines were deployed as planned, but there are still barriers to implementation, including limited geographic coverage and stockouts of associated commodities.
Robustness: (ranking = 2) The conclusion is corroborated by several sources of high quality data, including key informant interviews, meeting observations, and documented evidence.

Scale-up of GeneXpert diagnostic testing is another strategy that aims to narrow the case detection gap. GeneXpert machine scale up has been successful through various funding sources and partnerships, with the Global Fund as the largest contributor to this scale up. Of the 156 GeneXpert machines purchased since 2012, Global Fund supported 48 machines in 2016 and 62 in 2018. Yet, in a large country with 519 health zones, this corresponds to only one GeneXpert machine for every 3.3 health zones. Additionally, some centers faced recurrent stockouts of machine cartridges and cartridge expiration in 2018. As of 2019, the situation has improved and there is increased availability of cartridges, laboratory technicians and provider trainings.

Finding 10: HIV testing among TB patients is increasing, but not fast enough to keep pace with the rate of increase in new TB cases notified. The One-Stop-Shop strategy is designed to improve HIV testing and treatment in co-infected patients, but the strategy's roll out has been delayed.
Robustness: (ranking = 2) The conclusion is corroborated by several sources of high quality data, including key informant interviews, meeting observations, documented evidence, and quantitative data analyses.

Despite a 20% increase in TB case notifications and an 11% increase in HIV testing between 2017 and 2018, the number of TB patients tested for HIV decreased from 64% in 2017 to 60% in 2018. There was notable geographic heterogeneity with 6 DPS reporting very low rates Kasai (8%), Oriental Kasi (19%), Lomami (20%), Ecuador (42%), Kwilu (44%) and Mongala (46%). Low testing rates may be explained by poor integration of HIV into the CSDT service package, stockouts of rapid test kits for HIV, and weak integration of the One-Stop-Shop strategy in most health facilities.

Figure 9. TB cases and HIV tests performed; Percent tested HIV
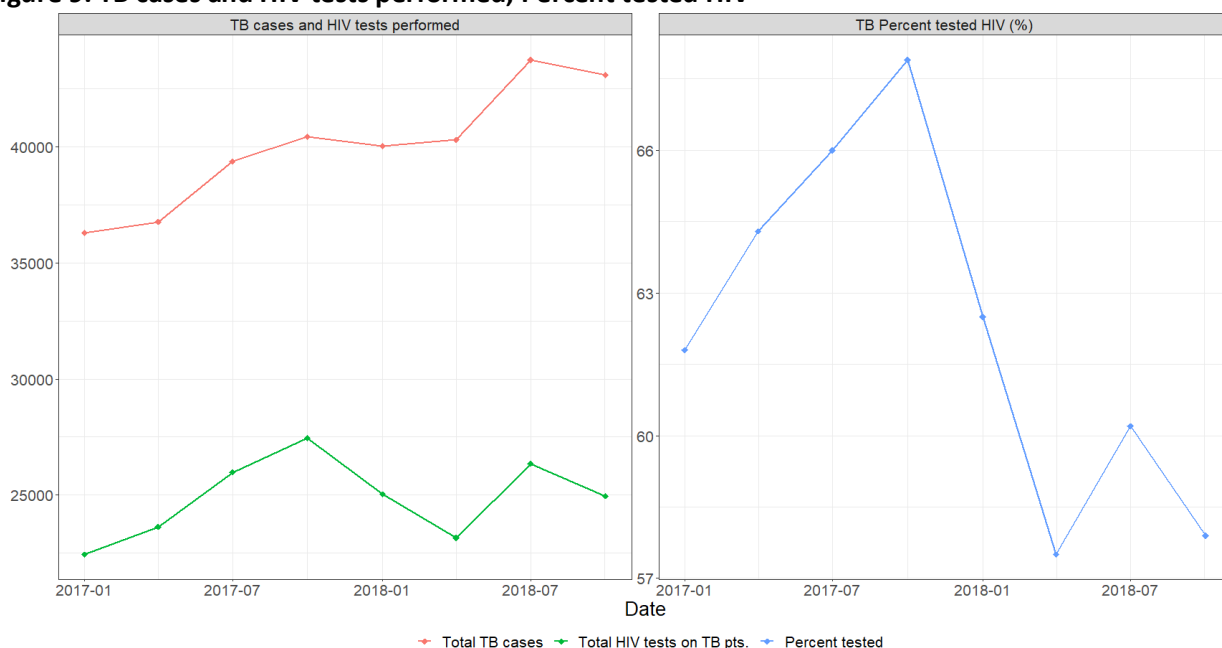
The model of offering integrated TB/HIV services known as the One-Stop-Shop remains fragmented and the operationalization of the model has not been implemented as planned. One difficulty in implementing the One-Stop-Shop has been the interdependence of stakeholders.

Before the One-Stop-Shop could be operationalized, there were prerequisites that needed to be met, including developing training and guidelines for providers at the central, intermediate and peripheral levels. PNLS and PNLT, in consultation with the Global Fund, developed the training materials. In September 2018 a draft manual was proposed and finalized, and in October 2018 the training workshops were conducted. By December 2018, health providers in 412 health zones were trained including 159 managers at the DPS-level, 2,060 managers at the BCZ, and 5,240 care providers from PNLS and PNLT.

There are areas the approach can still improve, especially around the procurement and supply chain for tests, improving coordination of co-infection activities, improving collaboration around referencing cases, and underreporting of persons living with HIV who receive TB preventive therapy.

4. Global Fund business model in practice

4.1 Cross-cutting facilitators and barriers to grant implementation and absorption

Although many of the challenges driving low absorption during the first six months of grant implementation have been overcome, some new challenges were observed in 2019. In addition, certain challenges identified in last year's report continued to pose implementation problems in 2019.

Finding 11: There is some evidence of operational efficiencies achieved through the new grant implementation arrangements, however challenges persist despite stakeholder efforts to resolve bottlenecks.
Robustness: (ranking = 1) The conclusion is corroborated by several data sources, including key informants data, documented evidence, and direct observation. There was strong convergence of opinions between stakeholders and data were considered of high quality.

Last year, we discussed the new grant implementation arrangements that were introduced during the 2018-2020 grant cycle to improve coordination between disease components and increase operational efficiency while improving country ownership and sustainability. These new arrangements included consolidating HIV and TB activities under a single PR, using province-level transversal SRs to manage all three disease areas in one province, shifting oversight for mutualized distribution of health products to Regional Distribution Centers (CDRs), and operationalizing government PR grants through the provincial government at the sub-national level. In 2018, there was some evidence of increased operational efficiency from the implementation of these new arrangements. An internal analysis conducted by Cordaid and SANRU found that transportation costs decreased between Q4 of 2017 and Q4 of 2018 (from US$0.90/kg to US$0.54/kg), but average delivery times increased (from 13 to 21 days). The increase in delivery times was likely related to challenges with synchronizing deliveries of commodities for all three diseases, and is discussed in greater detail below, whereas the decrease in distribution costs could be part of a wider trend. For example, our value for money (VfM) analyses show evidence of increasing cost efficiency in the procurement and transport of malaria commodities. Between 2010 and 2018, the cost per long-lasting insecticide-treated net (LLIN) shipped (which includes unit cost plus all costs associated with storage and transportation to the health zone) has fallen from US$17 to US$7. The cost to ship rapid diagnostic tests (RDTs) and ACTs have experienced similar drops over the same time period (see detailed analysis in Annex 4).

Despite these gains in efficiency, challenges remain in fully implementing mutualized distribution. One particular challenge has been the lack of synchronization between the TB/HIV and malaria PRs when placing commodity procurement orders and aligning schedules for re-stocking the CDRs, leading to a situation in which the commodities for the three diseases are not all available for distribution to facilities at the same time. Ideally, commodities for all three diseases would be centrally available for synchronized delivery to the CDRs but in practice, purchases through the pooled procurement mechanism go through different suppliers, each of whom has their own delivery schedule. One potential solution discussed by the PRs is having shared warehouses at the central level and shared transportation from the central level to the CDRs. The PCE has not yet seen evidence that this recommendation and others from the Q4 2018 analysis of mutualized distribution, conducted by Cordaid and SANRU, have been implemented. Rather, in 2019, the PCE continued to observe some of the same challenges, and noted measures that were taken by Global Fund to avoid stockouts, such as authorizing the SRs to conduct deliveries on an ad-hoc basis for specific disease components. Our analyses suggest that engagement and ownership of the strategy by the provincial health

> *"The major problem is that the DPS do not assume ownership of the grouped storage and transportation strategy."*
>
> *"People get together over meetings to address stock-outs but not for an assessment or anticipation of stock-outs."*
>
> *(Quotes from DRC stakeholders)*

divisions (DPS) has also been lacking and that the DPS could play a stronger supportive role. For example, the Technical Support Offices of the DPS could be more involved in supply chain management matters and help resolve bottlenecks.

In last year's report, we discussed the difficulties involved in operationalizing the provincial-level transversal SRs during early grant implementation. While recognized as a positive change that helped streamline SR support to the three disease components, the shift required substantial coordination and harmonization between the HIV/TB and malaria PRs, each of whom have separate contracts with the transversal SRs. In 2018 and 2019, the PRs and SRs discussed ways to improve the operationalization of provincial-level activities through transversal SRs during various workshops and forums, such as the Q1 2018 PR/SR coordination workshop, bi-annual Global Fund program reviews, and the Q3 2019 SR mid-term evaluation, which led to certain improvements. For example, monthly coordination meetings are now conducted between civil society PRs and the MoH to better monitor and coordinate SR activities. Other changes were implemented to minimize duplication and maximize efficiency. For example, in 2018 annual SR evaluations were conducted by both PRs, resulting in two different evaluations for each transversal SR, but in 2019 the two PRs conducted joint evaluations. Despite this progress, coordination between the HIV/TB and malaria PRs remains a difficult challenge. There are still additional improvements that can be made to lessen the burden on SRs who have reported difficulties reconciling the activities and competing priorities of both PRs at the same time, and managing the multitude of requests from each PR, especially given their limited human and financial resources. For the next grant cycle, Global Fund and country stakeholders should consider whether the current approach is an optimal model for delivering results in DRC.

Aside from the coordination challenges that have been unique to the new grant implementation arrangements, other specific coordination challenges between government and civil society PRs have impacted grant implementation and absorption. This is in part due to the complexity of activities implemented by government and civil society PRs that are often composed of multiple interdependent components that require significant planning and synchronization. For instance, the delays in rolling-out the HIV/TB One-Stop-Shop strategy caused by the conflicting agendas and timelines between the different stakeholder groups involved in carrying out the health worker trainings. Similarly, the PNLT's delayed implementation of trainings for community health workers on finding missing TB cases caused setbacks for Cordaid's community TB case finding activities. Another example was the integration of the key populations sub-module in DHIS2 which was the responsibility of the DSNIS but also depended on input from PNLS, and its delayed completion impacted Cordaid's ability to report on key populations indicators in DHIS2. Mechanisms, such as the responsibilities matrix and coordination meetings, have been established to better manage and coordinate these interconnected activities but execution still remains a challenge. One of the underlying root causes is the lack of communication and information sharing between stakeholders both at the national level and between national and sub-national levels. The PCE noted multiple instances in which stakeholders were unaware of what activities they were responsible for implementing and the amount of funds they were supposed to receive. In the case of the government PRs and SRs, grant funding must pass through many hands and in some instances key informants reported that funds were not received by the intended recipients. This lack of transparency presents a financial risk and can also lead to non-implementation of activities. Data entry into DHIS2 and supervision visits by health workers are examples of activities that were affected by stakeholders not knowing which staff are supposed to receive salary incentives or transportation stipends. The Global Fund and PRs should consider technological solutions, such as mobile money, which was used to transfer funds to data managers as part of the TierNet pilot project and has shown positive results; this could help improve accountability while ensuring that grant funds reach the intended recipients.

"The circuit (CAGF to DPS to Health Zone) for transferring funds to the health zones for monitoring meetings and supervision is not orthodox. Either these funds do not arrive, or they arrive late; unlike in New Funding Model (NFM) 1, funds flowed directly from SRs to the operational level and there were fewer problems in the involvement of ECZS [Equipes Cadre des Zones de Santé]." (Quote from a DRC stakeholder)

"The biggest difficulty is transportation money. For a supervision visit, transportation costs about 13,000 Congolese Francs [US$7.83]. Since December 2018, US$40 has been received for SSC supervision. After that, nothing else has been received. The Health Zone Administrative Manager does not explain how much time that money is supposed to cover." (Quote from a DRC stakeholder)

While communication and transparency issues were partially responsible for intended recipients not receiving grant funds, another factor was weak financial management. Despite efforts to reinforce financial management capacity (for example, through locally-based fiscal agents with expanded capacity building roles), poor adherence of DPS to financial procedures and problems with timely transmission of receipts and paperwork for verifying expenditures impacted the disbursement of funds from the national to subnational level. Even with the inclusion of one-month buffers built into each disbursement, delayed disbursement to DPS in some cases still affected activity implementation plans and timelines. In response, resources were allocated from the RSSH budget to procure and install the financial management software, *Tom2pro*, in 16 Global Fund priority DPS. The software, which digitizes and collates accounting documents at the province level, is intended to resolve some of the issues related to expenditure verification and will enable more timely monthly transfers of accounting documents to the MoH/CAGF. In 2019, 5 of the 16 provinces received the software and training.

In addition, heavy government procurement procedures stalled numerous activities and contributed to low absorption of the RSSH budget module among others. The consequences of the delayed procurements for items such as health facility registers and data collection tools, IT equipment, service contracts and vehicles are described in greater detail in earlier chapters.

4.2 Implementation of Grant Revisions

The DRC portfolio has gone through numerous grant revisions in 2018 and 2019. According to the Global Fund Operational Policy Note, grant revisions are intended to allow adjustments to programmatic requirements during grant implementation in order to ensure the continued effective and efficient use of Global Fund resources.(22) All three categories of grant revisions have been used in DRC, including additional funding revisions for HIV/TB and malaria grants, program revisions ("reprogramming") and budget revisions ("reallocation"). Annex 2 summarizes the program revisions and additional funding revisions that have been documented by the PCE to-date. Budget revisions are not included in the summary table because the PCE had more difficulty documenting these types of revisions. Since non-material budget revisions (revisions amounting to less than 15% change in the intervention budget) are approved by the PR and material budget revisions (revisions involving a greater than 15% change or introduction of new modules and interventions) are approved by the CT, but not necessarily documented in an implementation letter, they were more difficult to track. The PCE, however, noted changes in the semester budgets reflected in the PUDRs and interviews with key informants suggested that non-material budget revisions are routinely conducted during grant implementation.

Finding 12. Frequent grant revisions in DRC appear to be contributing to the effective and efficient use of Global Fund resources, in line with Strategic Objective 1 (SO1) goals, but also impact grant implementation because they are administratively burdensome and often require new budgets and performance frameworks, as well as reorienting stakeholders to new activity plans.
Robustness: (ranking = 1) The conclusion is corroborated by several data sources, including key informant and documented evidence. There was strong convergence of opinions between stakeholders and data were considered of high quality.

To-date the DRC has received over US$38.6 million in additional funding for HIV/TB and malaria. In all three cases, the additional funds were used to finance activities in the Prioritized Above Allocation Requests (PAARs) that were rated as high priorities by the Technical Review Panel (TRP). They also resulted in increases in the performance framework testing and treatment targets which are expected to maximize grant impact. Most of the program revisions described in Annex 2 were triggered by changes in unit costs or the availability of unspent balances from activities that were delayed. We estimate that roughly US$5 million in unspent balances was identified by the PRs in 2018 and the first half of 2019 and proposed for reprogramming to other activities. The process of identifying the unspent balances and going through review and approval by both the CCM General Assembly and Global Fund CT took about three months (January-March 2019) for the MOH HIV and TB grants. The process was longer for the SANRU malaria grant (January-August 2019) because approval for reprogramming was combined with the approval of other program revisions. We found that while the program revisions were initiated by the PR and reviewed by the CCM General Assembly, in some cases the CT had already discussed with the PR and reached consensus before the proposals were reviewed by the CCM.

This has led the CCM to question the utility of their review, but it also helped facilitate more timely approval by the CT and increased the likelihood of the CT's approval of the activities proposed by the PR and validated by the CCM.

As a high impact portfolio, DRC can request program and budget revisions at any time during grant implementation. While this added flexibility has been used to reprogram and reallocate funds in response to implementation realities and therefore boost grant absorption and impact, key informants also reported difficulties keeping track of the frequent budget changes. They also reported that the revisions are administratively burdensome and can have consequences on grant implementation since PRs have to divert time and energy toward revising budgets and performance frameworks and re-orienting SR work plans, which can lead to confusion and lack of continuity, especially at the sub-national level.

"Although positive for the achievement of targets, budget revisions should be accompanied by revisions to grant management [budgets], but all too often the focus is placed on inputs and not on other aspects such as human resources." (Quote from a DRC stakeholder)

4.3 RSSH: health management information systems and monitoring and evaluation

Since the previous DRC grant cycle, Global Fund has participated in broad multi-donor financial support to the 2015-2017 strategic plan for reinforcing the national health management information system (*Système National d'Information Sanitaire*; HMIS), which included adoption of the District Health Information Software 2 (DHIS2) as the principal platform for managing health information in the DRC. As of 2017, DHIS2 had been rolled out to all 26 provinces and 516 health zones in the country. Within the current grants, Global Fund investments in HMIS intend to consolidate these gains by further improving the quality of data in DHIS2 and their use in decision-making, in support of the 2018-2020 SNIS Reinforcement Plan (*Plan de reinforcement du SNIS, 2018-2020*). This reinforcement plan contributes to the three objectives of DRC's 2016-2020 National Health Development Plan related to the HMIS: (i) improve the completeness, timeliness and quality of data collected, (ii) improve analysis and production of health information and (iii) improve the distribution of health information.(23) Here, we evaluate progress in relation to these objectives, focusing on reporting completeness and timeliness, data quality, and data use and analysis by national disease programs.

Reporting completeness and timeliness for all three diseases improved dramatically in 2018 and early 2019, but data quality and use continued to pose challenges, especially at the health facility and health zone levels. Barriers to implementation included delays in approving and incorporating catalytic investments into grant agreements, poor internet connectivity, delays in vendor contracting to print and distribute data collection tools, and the use of parallel systems by PRs. Facilitators included the harmonization of the national health pyramid, revising and simplification of data collection and reporting tools, implementation of data road maps, and successful partnerships between international funders and national programs.

Financial allocation and absorption

The HIV/TB grant includes US$12,037,859 for the RSSH: HMIS and Monitoring and Evaluation (M&E) module, or 6.3% of the total grant allocation, with the majority awarded to PNLS (US$7,991,062; 66.4% of total) and the remainder awarded to PNLT (US$3,344,110; 27.9%) and Cordaid (US$692,687; 5.8%). Activities within this module focus on improving routine data quality (34.1%) and reporting (23.9%), including training M&E officers at the DPS and health zone levels (US$1.1 million) and transitioning to and scaling up the use of Tier.net (US$2.4 million), a software package that facilitates internet access and patient level data entry for HIV indicators. For HIV and TB, the module also includes surveys, including the 2018 IBBS and a TB prevalence survey. Given the lack of population representative estimates and routine census data in DRC, these activities are expected to improve program implementation and targeting.(12,24)

The malaria grants include a substantially larger allocation (US$22,546,027), with 65.8% awarded to PNLP (US$14,843,040) and 34.2% awarded to SANRU (US$7,702,987). Interventions within this module focus on routine reporting (43.4%) and analysis, evaluations, reviews and transparency (26.7%), including monthly health zone monitoring meetings (US$1,898,520) and providing modems and VSAT internet credits to health

zones (US$1,217,340). HMIS/M&E investments in both grants together represent 6.4% of the total allocation and include the US$2.9 million in Matching Funds to reinforce the expansion and use of DHIS2.

Finding 13: Delayed implementation of HMIS activities, primarily caused by non-completion of procurement activities, resulted in a low rate of absorption for modules related to strengthening the HMIS.
Robustness: (ranking = 1) The conclusion is corroborated by several data sources, including key informant data and documented evidence. (COD-M-MOH DSNIS Management Letter January-December 2018).

For both disease grants, the RSSH: HMIS and M&E module represents the single largest allocation for RSSH, yet only 35.9% had been spent as of July 2019. No intervention within this module reported absorption above 50%, with the highest absorption under "analysis, review and transparency" (49.3%, $2,312,187 out of $4,690,545 budgeted) and "program and data quality" (37.2%, $2,048,411 out of $5,502,626 budgeted). The lowest performing intervention is "vital registration systems" which has spent $0 out of $28,410 budgeted. Stakeholders reported three major causes of low absorption from S1 2018 through S1 2019: delayed approval and integration of catalytic investments in grant agreements; poor internet connectivity, especially in areas without 3G or 4G cellular coverage, which delayed expansion to some health zones; and delays in vendor contracting for printing data collection tools. As a measure to ensure continuity, SRs now print and distribute tools in their respective health zones.

Since 2017, the number of facilities reporting to DHIS2 has increased significantly – from 15,461 facilities in January 2017 to 16,771 in January 2019 for malaria indicators, and from 1,353 to 4,334 for HIV. By early 2019, 2,001 CSDTs were integrated into DHIS2 for TB data. PEPFAR, which supports all HIV-related services in Haut-Katanga and Lualaba, military sites, and 18 health zones within Kinshasa, intends to integrate 98% of health facilities by September 30, 2020, with all health zones actively using data from DHIS2.(12) Although PEPFAR, SANRU, and Cordaid maintain parallel systems for reporting health information, all three organizations have created "gateways" that synchronize DHIS2 data with the parallel platforms. Additional facilitators of DHIS2 integration and timely reporting include:

Simplification of data collection and reporting tools: Stakeholders consider the malaria reporting tool simpler than the HIV tool, resulting in higher reporting percentages for malaria indicators. This includes the total number of "reports" filed (number of health facilities reporting) and the number of indicators reported (completeness of reports). In addition, stakeholders noted that the 2019 reduction in length of the HIV reporting tool - from 32 to 12 pages - facilitated increased reporting.

Harmonization of the health pyramid: Inconsistent reporting as to the number and type of health facilities represented an ongoing barrier to implementation planning. For example, the same health zone often had different numbers of sites reported per partner organization. In addition to this harmonization, implementation of "road maps" for integrating data into DHIS2 showed positive results.

Partnership between funders: Development of the 2018-2020 DSNIS Reinforcement Plan (*Plan du reinforcement de SNIS, 2018-2020*) was supported by several international funders, including the Global Fund, Gavi, The World Bank, The Department for International Development (DFID) and the U.S. Agency for International Development (USAID). In addition, the Global Fund and Gavi are co-financing a survey of the Data Quality Reporting (DQR) data. This study will be conducted nationwide and was scheduled for July 2018; SANRU is in charge of recruiting an agency to conduct the survey and at the time of writing, the recruitment process is underway.

Finally, stakeholders reported that there was a misunderstanding among implementers that salary incentives for data managers from the CAGF were intended as incentives for malaria data entry, resulting in data entry personnel in some health facilities "favoring" malaria indicators over data entry for other diseases.

"Health zone data managers are more motivated by malaria data because they believe that their bonuses are awarded based on PNLP data (even though it's for all three diseases)." (Quote from a DRC stakeholder)

HMIS data quality and use: improving accurate data entry and data-informed decision making

Finding 14: Although the national programs have made significant progress regarding completeness and timeliness of reporting in DHIS2, data quality remains poor, and data in DHIS2 are not widely used by implementers.
Robustness: (ranking = 1) The conclusion is corroborated by several data sources, including key informants, documented evidence, and direct observation. There was strong convergence of opinions between stakeholders and data were considered of high quality.

Despite improvements in reporting completeness, stakeholders report that data quality is poor and there is limited use of DHIS2 data for analysis and decision-making at lower levels of the health system. This is due in part to the fact that the operational level does not feel involved in data analyses and discussions. Stakeholders at lower levels stated that they transmit reports to the central level as required but do not use the data locally for improving implementation, with one stakeholder saying, **"the data are like a DHL service."** To ameliorate the situation, cost savings from early implementation will be used to train specialized program managers with a focus on increasing capacity around the use of data.

The issue of underreporting and poor data entry is not unique to DHIS2, but rather a broader systemic challenge across all data collection platforms; it also inhibits some regional decision making. For example, DRC is a member of The West African Regional Network for Tuberculosis Control (WARN-TB) and The Southern African Development Community. Unfortunately, in 2018 the country was unable to use HMIS TB data to report to these surveillance networks due to poor completeness and quality. Additional data exploration supported these concerns: at a 2019 PCE-supported data compliance workshop with PNLT, the internal TB program data and DHIS2 data values differed by 19%.

In an effort to reinforce the use of DHIS2, in 2018 the CT began requiring that PRs calculate progress against performance indicators in the PU/DRs using data reported in DHIS2, however the process of shifting data sources over to DHIS2 did not effectively begin until S2 of 2018. Stakeholders report that this requirement had a positive effect on facility integration; however, while the national programs complied with the requirement, program staff from the HIV and TB programs did not consider DHIS2 data reliable enough to use for program implementation. 2018 data are considered especially problematic for indicators involving HIV testing among key populations, inventory stock outs and community-based activities.

4.4 Provincial approach

A total of US$3 million was budgeted for the provincial approach in the malaria grants and RSSH modules, including US$2.4 million in the MoH/CAGF grant and US$600,000 in the SANRU grant.

In last year's PCE report, we discussed the process of establishing the provincial approach – a process that spanned nearly all of 2018. While certain aspects of the provincial approach, such as increased engagement of the Global Fund Country Team at the province level, had taken effect during 2018, other aspects such as development of provincial level work plans and budgets were still under discussion. For this reason, in 2018 we documented a fair amount of uncertainty among stakeholders about how exactly the provincial approach would be operationalized. As the PCE continued to track the roll-out of the provincial approach during 2019, we found that much progress was made moving from the planning phase into full implementation. Key milestones included the January/February workshops in Maniema and Kinshasa to review and validate the provincial approach activities proposed by each province. Following these workshops, 2019 budgeted works plans were approved by the Global Fund in April and first disbursements were issued by the CAGF to the Kinshasa and Maniema DPS in May. The activities budgeted by both provinces were identified during the October 2018 bi-annual program reviews that were held for the first time at the province level and were based on an analysis of progress made in reaching performance indicators. The activities proposed are therefore intended to fill gaps and address bottlenecks to boost program performance in TB, malaria, and RSSH. They broadly include the purchase of equipment (e.g., modems and data credits) to improve internet connectivity; costs associated with travel to health zones to support data entry into DHIS2, analysis and data use; trainings on topics including financial management procedures, supply chain management, treatment protocols, etc.; and costs associated with supervision visits. HIV activities were not included in these initial budgets because more analysis was needed to better define strategic interventions with the greatest potential for impact.

Although it is early on in the implementation of the provincial approach, we found process evaluation evidence that progress is being made across each of the five provincial approach objectives. Table 10 below summarizes some of the key process milestones and achievements in each of the five objective areas.

Table 10. Key process milestones and achievements related to provincial approach objectives

Objectives	Areas supported by the Provincial Approach and progress made to-date in meeting objectives
1. Increase impact on the three diseases	● Provincial-level reviews conducted in October 2018 and August 2019 focused on progress made toward achieving grant performance indicators, identifying challenges and recommendations for improvement. ● Provincial level performance frameworks with province-specific targets were developed to facilitate closer monitoring and analysis of province performance. Provincial-level reporting on coverage indicators is now included each semester in the PU/DRs. ● Work plans and budgets for additional activities (funded with the PA budget) were developed based on a needs analysis for boosting TB, malaria, and RSSH performance (HIV activities are still pending).
2. Reinforce provincial government capacity (DPS and IPS)	● Province-level operational plans (PAO) were developed for 2019 and the single contract (*contrat unique*) for Maniema and Kinshasa DPS was signed in Q2 of 2019, aligning donor and government financial contributions. ● DPS working group meetings were regularly held between provincial level actors, including the provincial coordination representatives for the three diseases, Global Fund PRs and SRs, regional distribution centers (CDRs), and regional medical stores, along with identification of targeted activities, to improve quantification, stock management, and coordination. ● A collaboration framework ("cadre de collaboration") was agreed upon and signed between the Inspection Provinciales de la Santé (IPS) and DPS of Kinshasa (May 2019) and one is under development for Maniema. ● Support from the GF Country Team has led to improved analysis of routine data for decision making and problem solving and contributed to quicker resolution of bottlenecks and addressing implementation gaps for each of the three diseases.
3. Reinforce province-level health systems	● Strengthened DHIS2 functionality with improvements to DPS and health zone internet connectivity, updated health facility maps, configuration of data dashboards and support for data analysis and validation at health zones and facilities. ● Additional resources budgeted in provincial work plans for conducting supervision visits, coaching, and supporting health zones in data analysis and monitoring.
4. Reinforce community systems	● Community health worker mapping is underway in Maniema for better integration of community activities across the three diseases.
5. Increase counterpart financing from the provincial government	● Verbal agreement was made by the Maniema provincial government to provide counterpart financing to provide complementary inputs (e.g., medicines for diarrhea and acute respiratory illness) to complete the package of care for integrated management of childhood illnesses (IMCI).

Table 11 below highlights the key lessons drawn over the last two years, spanning the development, launch, and early implementation of the provincial approach. These lessons may be used to inform improvements in the current pilot provinces and in new provinces as the approach is expanded. They also provide considerations for how to improve provincial-level engagement in the next funding cycle.

Table 11. Provincial approach lessons learned

Issue area	Lesson learned	Recommendations for future provinces and/or next funding cycle
Coordination between disease areas to develop integrated activities	The budget for the provincial approach was included in the Malaria grant, which created some coordination difficulties between the PRs and transversal SRs. It also complicated the process of identifying integrated activities to reinforce community systems, which remains relatively weak compared to progress made against other provincial approach objectives. Most planned activities are providing vertical support to specific diseases. The nomination of provincial approach focal points in each province (starting Q1 of 2019) is expected to help improve coordination and integration of systems strengthening activities across diseases.	● Grouping the provincial approach and RSSH activities within a stand-alone RSSH grant (which is already under consideration) may help improve operationalizing cross-disease investments in RSSH. ● As the provincial approach is expanded to other provinces, additional technical support from partners should be anticipated to help stakeholders (at province and HZ levels) identify community challenges and propose activities that reinforce community systems. ● Provincial approach focal points should be considered in future provinces. In addition, the creation of a provincial approach task force or management unit composed of members from government and civil society at both central and provincial levels – as is currently under consideration for NFM3 – could help to further improve coordination and integration.
Province level technical capacity and role in strategic planning	Provincial governments have historically not had an active role in strategic planning and therefore generally have weak decision-making power, thus impacting their ownership and accountability for grant implementation. Although provincial level dialogues were conducted to help inform the 2017 funding requests, budgets and performance targets continue to be determined by national stakeholders and shared with provinces through a top-down process. In terms of identifying provincial approach activities, provinces were somewhat limited in what activities they could propose while remaining aligned with national strategies. In addition, weak provincial government capacity to analyze their needs and propose effective strategies for reinforcing health systems was a challenge. Extra support – including monthly trips to DRC in 2018 – from the GF CT was necessary to help the provinces select appropriate activities, although as the provincial approach is further institutionalized the level of support required from the GF will likely reduce.	● Global Fund should continue to reinforce provincial level dialogues during the next funding cycle and seek opportunities for provinces to define budgets and targets. ● As the provincial approach is expanded to other provinces, the Global Fund should consider ways to replicate the model with greater efficiency. This could include better anticipating the level of technical support required by provinces to analyze needs and propose effective strategies and channeling such support through technical partners or through other mechanisms, such as the provincial approach task force or management unit that is currently under consideration for NFM3.
Flexible grant mechanisms	Operationalization of the provincial approach budget has been particularly flexible and therefore a noted success factor. US$3 million was included in the 2018-2020 grant budgets for a set of activities that were not yet defined at the time of grant signature. Nonetheless, the PRs were not required to go through additional review and approval processes. Rather, the provinces, in consultation with the GF CT, agreed on a set of activities that were timely and	● Global Fund should continue to support flexible grant mechanisms that allow for provincial level activity programming that is nimble and responsive to province needs.

	responsive to province needs. In addition, the work plans are reviewed each semester which provides another opportunity for the provinces to adjust and add activities as needed.	
Monitoring and evaluation	Implementation of provincial-level program reviews, as well as the development of province-level performance frameworks and coverage indicator targets is enhancing provincial level capacity to analyze program performance, identify issues, and resolve bottlenecks. In addition, the feedback provided in the Global Fund management letters on the provincial approach is a new measure that should help to hold provincial authorities accountable for results.	● Global Fund should continue to support provincial level program reviews and require disaggregated reporting on performance indicators from pilot provinces. Although the Kinshasa and Maniema DPS are not principal grant recipients, as part of the Global Fund's enhanced engagement at the provincial level, it would be beneficial for the Global Fund to continue providing feedback to the provincial approach provinces on their performance in management letters.

5. Summary analysis and implications of findings for course correction

Table 12. Summary of Findings, Recommendations and Strategic Considerations

	Disease Specific Findings	Recommendations and Strategic Considerations
Malaria	• The Global Fund successfully leveraged partnerships to improve community-level health system integration and accelerate improvements in malaria outcomes. • Integrated community case management (iCCM) may have contributed to greater reductions in malaria mortality in children under-5.	1. The Global Fund CT, PRs and technical partners should work together on solutions to improve government ownership and sustainability of investments in SSCs and community-based approaches.
	• Stakeholders reported limited disruption of services caused by stockouts of RDTs and ACTs, but some evidence suggests that stockouts had a negative effect on service coverage.	2. Stronger systems and indicators are needed to improve stock tracking and monitoring such as a stock-out warning and reporting system, as recommended by the 2019 DRC OIG audit. 3. Improved strategies are also needed for capturing data from SSCs on stock management and service delivery. Digital solutions, such as reporting via mobile phone, could help automate and improve reporting timeliness. 4. DPS leadership is needed to improve mutualized distribution by the Regional distribution centers (CDR) in order to follow the established standards. 5. Greater PR oversight is needed to improve estimation and quantification of SSC needs.
	• Addressing operational challenges, such as weak ownership and oversight by both provincial and health zone authorities, health information system challenges and difficulties in the disbursement and processing of funds from the national to the peripheral level could lead to additional gains in malaria community case management.	6. Reduce operational challenges by strengthening all levels of the health system by targeting the health information system, the organization of supervision systems and simplify disbursement procedures [RSSH] 7. Better systems are needed to improve transparency and ensure that funds for supervision, coaching, salary incentives, etc. reach the intended recipients. The mobile money approach that was used in the TierNet pilot project has been promising and could be tested on a pilot scale in other provinces.
HIV	• Cost-effective strategies to improve HIV case notification have been incompletely implemented, resulting in stockouts of first-line HIV tests.	8. The Global Fund CT, PRs and other implementing partners should collaborate to develop a clear and actionable plan to disseminate and reinforce the targeted testing strategy at all levels of the health system, including the use of supportive supervision or other strategies to monitor progress against stated national goals.
	• Government co-financing plans included procurement of HIV tests intended for blood donor screening and, while according to preliminary reports, government co-financing commitments were met, information is limited as to whether these commodities were procured.	9. The CCM should put into place an effective mechanism to monitor and manage co-financing commitments. a. Ensure periodic evaluation (to be specified by stakeholders) on the implementation of country commitments.
	Where implemented, community outreach activities successfully improve HIV testing coverage for key and priority groups.	10. Global Fund stakeholders should use the data from existing studies (in particular: mapping and size estimation of key populations study and the integrated HIV bio-

		behavioral surveillance study (IBBS 2018-2019)) to inform the National Strategic Plan as well as the funding request and the development of targets (establish priorities and set objectives).
	Distinct testing strategies had conflicting objectives, resulting in differential outcomes. One example is performance-based financing (PBF) for HIV tests, which stakeholders report may reinforce widespread testing of low risk populations.	11. At the time of finalizing this report, the PBF indicator was changed to reflect the test positivity rate. It is therefore recommended that the Global Fund monitor how this change in indicator has allowed for better alignment with the new targeted testing strategy.
TB	Community activities to search for missing cases have not been implemented as planned and have been delayed due to inability to implement necessary precursory activities, with consequent low absorption of catalytic funds.	12. Given the successes of the mobile screening strategy, the Global Fund Country Team and PRs should consider the feasibility of smaller units that could be expanded to additional geographies with more difficult access.
	GeneXpert machines were deployed as planned, but there are still barriers to implementation, including limited geographic coverage and stockouts of associated commodities.	13. The government should continue to advocate with different partners to acquire more GeneXpert machines and their accessories (cartridges) for better geographical coverage. 14. PNLT should establish a team of trained technicians at the provincial level (to ensure optimal GeneXpert use and maintenance).
	4. HIV testing among TB patients is increasing, but not fast enough to keep pace with the rate of increase in new TB cases notified. The One-Stop-Shop strategy is designed to improve HIV testing and treatment in co-infected patients, but the strategy's roll out has been delayed.	14. The Global Fund CT and partners should examine implementation of the One-Stop-Shop strategy and resolve any barriers that may be driving sub-optimal uptake by providers. 15. DRC government and partners should improve the coverage of the One-Stop-Shop. 16. PNLT should operationalize both models developed for the One-Stop-Shop: "integrated" and "collaborative."

	Crosscutting Findings	Recommendations and Strategic Considerations

Grant implementation	• There is some evidence of operational efficiencies achieved through the new grant implementation arrangements, however challenges persist despite stakeholder efforts to resolve bottlenecks:
	  o Poor coordination between government and civil society PRs
	  o Limited accountability and weak communication at different levels of the health pyramid
	  o Weak financial management capacity and non-compliance with financial procedures
	  o Shared distribution of health commodities by CDR
		17. The PRs should work together on improving the procedures for mutualized distribution. This may include considering shared central warehouses and other solutions for synchronizing schedules for re-stocking CDRs.
		  a. Global Fund & PR: Harmonizing orders into a single supply line for DRC products at the same time. (At Wambo level)
		  b. Global Fund should allow buffer stock at all administrative levels: country level (6 months), provincial level (3 months), health zone (1 month).
		  c. The CDR and DPS (Technical medication group; Groupe Technique Médicament) should improve the joint monitoring of orders and consumption of drugs at the FOSA level (quantification)
		  d. Provincial health inspector (IPS) should ensure the application of the drug supply responsibility matrix.
		18. PRs should continue strengthening inter-PR coordination mechanisms and find ways to lessen the burden of the grant implementation arrangements on transversal SRs.
		19. The Global Fund CT should continue investing in strategies that support improvements in financial management, such as the Tom2pro software, and capacity building.

Grant revisions	• Frequent grant revisions in DRC appear to be contributing to the effective and efficient use of Global Fund resources, in line with Strategic Objective 1 (SO1) goals, but also impact grant implementation because they are administratively burdensome and often require new budgets and performance frameworks, as well as reorienting stakeholders to new activity plans.	20. The Global Fund should examine grant revision processes and consider ways to reduce their administrative burden and impact on grant implementation. 21. The Global Fund should consider developing a centralized repository, managed by PRs or CCMs, where key grant revisions are documented and tracked to ensure stronger transparency.
RSSH	• Delayed implementation of HMIS activities, primarily caused by non-completion of procurement activities, resulted in a low rate of absorption for modules related to strengthening the HMIS.	22. If possible, the CAG should decentralize for the reproduction of certain (primary) data collection tools at the provincial level and the Global Fund should agree to this adjustment a. CAG should maintain three-year framework contracts with suppliers (prequalify suppliers to prevent delays) 23. CAG should use the same distribution channel as health commodities [CDR] for the distribution of data collection tools

	• Although the national programs have made significant progress regarding completeness and timeliness of reporting in DHIS2, data quality remains poor, and data in DHIS2 are not widely used by implementers.	24. The Global Fund CT should continue investing in strengthening human resources at different levels of the health system to ensure both adequate capacity for data entry, but also for data analysis and use. a. Including reinforcement of supervision/coaching by national and provincial technical experts to support the health zones 25. The Global Fund CT, PRs and technical partners should invest even more in monitoring meetings to improve the quality of these. Condition monitoring costs to improve the quality of these meetings and the quality of data (feedback, meeting methodology).
Provincial approach	• The provincial approach is still in early stages of implementation, but evidence suggests that progress is being made across each of the five objectives.	26. Grouping the provincial approach and RSSH activities in a stand-alone RSSH grant (which is already under study) can help mitigate the challenges encountered when programming RSSH investment activities. 27. As the provincial approach is expanded to other provinces, Technical and Financial Partners should build on existing local capacities and strengthen governance and needs analyses in order to support the new provinces in identifying critical activities to be funded for strengthening the health system, including at the community level. 28. The Secretary General for health should develop mechanisms to reinforce collaboration and accountability between both structures. In addition, both structures must clearly define the assistance and technical support necessary to strengthen provinces' capacity and engagement in strategic planning, including identification of needs and the development of the provincial strategic plan. 29. Provincial approach focal points should be considered in future provinces. 30. The Global Fund CT should continue to reinforce provincial level dialogues during the next funding cycle and seek opportunities for provinces to define budgets and targets.
	• The PCE identified several lessons from the development and roll-out of the provincial approach that could lead to implementation improvements and expansion of the approach to new provinces.	31. As the provincial approach is expanded to other provinces, the Global Fund should consider ways to replicate the model with greater efficiency. This could include better anticipating the level of technical support required by provinces to analyze needs and propose effective strategies and channeling such support through technical partners or through other mechanisms. 32. Global Fund should continue to support flexible grant mechanisms that allow for provincial level activity programming that is nimble and responsive to province needs. 33. The Secretary General for Health / CT should include coverage indicators with disaggregated causal analysis for the three diseases, as well as process and system performance indicators, in the contract between the DPS and General Secretariat for Health, monitoring semi-annual feedback from the Global Fund country team.

6. Dissemination

Use of findings in DRC during 2019

PATH-DRC held a stakeholder workshop on 3 April 2019 and presented results and strategic considerations from the 2019 Annual Country Report. More than 60 representatives participated in the workshop, including the Secretary General of Health (Dr. Yuma), 2nd Vice-President of the CCM (Christian Luzombe), Dr. Jackson Ukila (CCM Monitoring and Evaluation). Mr. Nicolas Farcy, Fund Portfolio Manager of the Global Fund CT was also present. The workshop featured a lively and constructive debate and the conclusions were positively received. Stakeholders actively engaged in co-creating recommendations that were incorporated in the final version of the report, which was circulated to stakeholders in May 2019.

In late April 2019, the PCE supported PNLT to clean and validate 2018 TB program data. Working with PNLT helped the PCE to better understand the approach for missing case finding that was being taken to boost TB case notification. As a result of the cleaning and validation exercise, the gap between DHIS2 and programmatic data became clear, and the decision was made to enter historical TB data into DHIS2 going back to 2016.

In November 2019, at the request of the Director of the PNLP, the PCE shared the 2018 and 2019 PCE Annual Country Reports. The Director requested the reports to use for consultation and reference during the development of the Malaria National Strategic Plan for 2021-2023. The PCE has planned a working session to share the results of the malaria community case management deep dive with the national program before the end of 2019. In addition, to support the 2021-2023 grant application cycle in DRC, the PCE plans to coordinate with the CCM (Permanent Secretary, CSS and CEP) to identify an opportunity for re-sharing PCE recommendations from the previous grant application cycle with stakeholders.

It should be noted that the preliminary conclusions and recommendations of the PCE will be discussed in consultation with the High-Level Advisory Board prior to final dissemination of the current report to country stakeholders. Of the original five members, only three are still available and the PCE plans to recruit two additional members with the support of the Kinshasa School of Public Health.

2020 Dissemination

PATH-DRC held a dissemination meeting on February 19, 2020 in Kinshasa with national and provincial partners, academics and policymakers. 2019 results were presented and attendees were split into groups to validate and improve the draft recommendations. Through joint-development, the recommendations were revised and made more actionable.

References

1. James SL, Abate D, Abate KH, Abay SM, Abbafati C, Abbasi N, et al. Global, regional, and national incidence, prevalence, and years lived with disability for 354 diseases and injuries for 195 countries and territories, 1990–2017: a systematic analysis for the Global Burden of Disease Study 2017. The Lancet. 2018 Nov 10;392(10159):1789–858.

2. Roth GA, Abate D, Abate KH, Abay SM, Abbafati C, Abbasi N, et al. Global, regional, and national age-sex-specific mortality for 282 causes of death in 195 countries and territories, 1980–2017: a systematic analysis for the Global Burden of Disease Study 2017. The Lancet. 2018 Nov 10;392(10159):1736–88.

3. Ministère de la Santé Publique, République Démocratique du Congo. Plan strategique national de lutte contre le paludisme. 2016.

4. Institut National de la Statistique. Main results of the Multiple Indicator Cluster Survey - Palu, RDC 2017-2018 [Internet]. 2019 Jul. Available from: https://www.unicef.org/drcongo/en/reports/summary-mics-palu-2017-2018

5. le Fonds des Nations Unies pour l'enfance (UNICEF), SANRU. Protocole d'accord de collaboration entre SANRU et UNICEF de la mise en ouevre du paquet de prise en charge inegree des maladies de l'enfant au niveau communautaire (PCIME-c) en RDC. 2018.

6. Office of the Inspector General. Global Fund Grants to the Democratic Republic of the Congo [Internet]. Geneva, Switzerland: The Global Fund; 2016 Sep. Report No.: GF-OIG-16-022. Available from: https://www.theglobalfund.org/media/2663/oig_gf-oig-16-022_report_en.pdf?u=637066540590000000

7. École de Santé Publique, Université de Kinshasa et ICF. Évaluation de la Prestation des Services de Soins de Santé 2017-2018 : Rapport de synthèse. Rockville, Maryland, USA: ESPK et ICF; 2019.

8. 2018 Enquête de Vérification de l'Utilisation finale [Final Use Verification Survey]. 2018.

9. Office of the Inspector General. Follow-up audit of Global Fund Grants in the Democratic Republic of Congo [Internet]. Geneva, Switzerland: The Global Fund; 2019 Jul. Report No.: GF-OIG-19-014. Available from: https://www.theglobalfund.org/media/8584/oig_gf-oig-19-014_report_en.pdf?u=637066540220000000

10. UNAIDS. UNAIDS. Democratic Republic of the Congo [Internet]. 2019 [cited 2019 Dec 3]. Available from: https://www.unaids.org/en/regionscountries/countries/democraticrepublicofthecongo

11. Manuel du préstataires Dépistage ciblé VFF. Internal document; 2019.

12. PEPFAR. Democratic Republic of the Congo Country Operational Plan (COP) 2019 Strategic Direction Summary [Internet]. 2019. Available from: https://www.state.gov/wp-content/uploads/2019/09/DRC_COP19-Strategic-Directional-Summary_public.pdf

13. The Global Fund. Price & Quality Reporting Transaction Summary [Internet]. Tableau website. [cited 2019 Dec 3]. Available from: https://public.tableau.com/views/PQRTransactionSummary_V1/TransactionSummary?%3Aembed=y&%3AshowVizHome=no&%3Adisplay_count=y&%3Adisplay_static_image=y&%3AbootstrapWhenNotified=true

14. Programme National Multisectoriel de Lutte contre le Sida (PNMLS). Plan Strategique National de la riposte au VIH/SIDA 2018-2021. 2018 Avril.

15. Institute for Health Metrics and Evaluation (IHME). GBD Results Tool | GHDx [Internet]. IHME, University of Washington, 2017.; Available from: http://ghdx.healthdata.org/gbd-results-tool

16. Preliminary report on public expenses. Internal document; 2019.

17. LFA Report on Use of HIV Test Kits. 2019.

18. Ministère de la Santé Publique, République Démocratique du Congo. Plan National de Développement Sanitaire 2011-2015. 2010.

19. Stop TB Partnership. DEMOCRATIC REPUBLIC OF THE CONGO Dashboard [Internet]. [cited 2019 Dec 2]. Available from: http://www.stoptb.org/resources/cd/COD_Dashboard.html

20. Global tuberculosis report 2019. Geneva, Switzerland: World Health Organization; 2019. Report No.: ISBN 978-92-4-156571-4.

21. Touré-Fadiga B. Lettre de Performance au Directeur du Programme national de Lutte contre la Tuberculose et au Ministère de la Santé. 2019.

22. Global Fund Operational Policy Note on Grant Revisions. 2018.

23. Ministère de la Santé Publique, République Démocratique du Congo. Plan National de Développement Sanitaire 2016-2020 [Internet]. 2019. Available from: http://www.nationalplanningcycles.org/sites/default/files/planning_cycle_repository/democratic_republic_of_congo/pnds_2016-2020_version_finale_29_avril_2016.pdf

24. Cyril Owen Brandt, Tom De Herdt. On the political economy of data collection: lessons from the unaccomplished population census (Democratic Republic of the Congo, 2006-2018) [Internet]. 2019. Available from: https://securelivelihoods.org/wp-content/uploads/DRC-census-working-paper-fina-online.pdf

25. Chang AY, Ogbuoji O, Atun R, Verguet S. Dynamic modeling approaches to characterize the functioning of health systems: a systematic review of the literature. Soc Sci Med. 2017;194:160–7.

26. Evaluation Planning Tool [Internet]. [cited 2019 Dec 3]. Available from: https://evaluationplanningtool.org/

27. Jonaker J, King G, Blackwell M. Amelia II: A Program for Missing Data. J Stat Softw. 2011;45(7):1–47.

Annex 1: Deep Dive Evaluation Questions

Malaria

- How are Global Fund investments in community case management contributing to maximizing impact against malaria?

- How are investments in community strategies such as integrated community case management (iCCM) improving access to services? How are models for integrated service delivery improving health outcomes?

- How is the iCCM partnership with UNICEF contributing to improving intervention effectiveness?

HIV

- How are Global Fund investments contributing to improvements in HIV testing services and case identification in DRC? Specifically:

  - What have been the successes and challenges of implementing the national testing strategy?

  - What is the role of the new targeted testing strategies in reaching key and priority populations to accelerate case identification and diagnosis for people living with HIV (PLHIV)?

  - How are new approaches, such as the "one-stop-shop" contributing to improving HIV testing among TB patients?

  - To what extent is performance-based financing (PBF) contributing to more effective and efficient HIV testing?

Annex 2. Summary of DRC grant revisions

Grant and Approval Date	Budget increase or reallocation ($US)	Description of revision
Additional Funding Revision		
MOH-Malaria & SANRU - Malaria March 2019	• US$8.5 million increase to MOH grant from Portfolio Optimization • US$20.8 million increase to SANRU grant from Portfolio Optimization and debt-to-health agreement	• Financing to extend mass ILLN distribution campaign to 8 additional provinces (rated "high priority" by TRP in PAAR). • PBF budget reduced from US$10m to US$5.6m and reallocated to 2020 ILLN campaign budget. • Performance frameworks revised.
MOH-Malaria Oct. 2019	• US$525,201 increase from Portfolio Optimization	• Added training for community HWs to improve early identification of epidemiological peaks through community-level surveillance (rated "high priority" by TRP in PAAR). • Added assessment to measure intervention impact. • No change to performance framework.
CORDAID-TB/ HIV *Date TBD*	• US$8.7 million increase from Portfolio Optimization	• Extended coverage to an extra 59 HZs to test and treat TB patients (rated "high priority" by TRP in PAAR). • Scale-up of ART activities in 354 priority HIV HZs and implementation of demand creation activities in 33 HZs. • Performance framework revised.
Program Revisions		
MOH-Malaria & SANRU - Malaria Aug. 2018	• US$25.2 million increase to MOH grant • US$141.5 million increase to SANRU grant • US$2.9 million increase to MOH grant for RSSH/data systems matching funds	• Funds and targets were transferred from PSI (PR withdrawn before grant approval) to SANRU and MOH for implementation of the mass LLIN distribution campaigns. • Performance frameworks revised to include indicator targets for mass ILLN distribution campaigns.
MOH-HIV March 2019	• Out of US$1.7 million in savings, GF approved reprogramming funds to new activities totaling US$1.1 million including: laboratory rehabilitation, HIV/TB university courses, resistance study, and data certification.	• 2018 absorption analysis identified savings from over 30 budget line items, including the largest amounts from health zone level trainings, health care worker salary incentives, technical assistance plan
MOH-TB March 2019	• Out of US$1 million in savings, GF approved reprogramming funds to new activities totaling US$69,000 including: costs associated with maintaining the national reference laboratory and procuring a bus for mobile testing,	• 2018 absorption analysis identified savings from over 30 budget line items, including the largest amounts from supervision visits to the health zone level, extension of GeneXpert warranties, monitoring activities associated with finding TB missing cases, PR HR expenses, etc.
SANRU-Malaria Aug. 2019	• Reallocation of U$7.6 million from the PBF line item toward private sector activities (not included in PAAR).	• S1 and S2 2018 absorption analysis identified savings mainly from the human resources budget line due to activity start-up delays and the communication and program management

	• US$500,000 for DQR transferred from MOH to SANRU. • Reprogrammed US$1 million in savings toward malaria commodity handling costs, PSM costs associated with iCCM inputs, and police security for the mass ILLN distribution campaigns.	budgets associated with the mass ILLN distribution campaign. • Performance framework was revised to include indicator targets for the private sector activities.
MOH-Malaria (RSSH) *(Pending)* Nov. 2019	• US$1.3 million in savings from the RSSH budget allocated to DSNIS. The PR (CAGF) proposed reprogramming the funds toward conducting RDQAs, training program specialists in DHIS2 and DHIS2 use, and training DPS and HZs in "integrated supervision". The proposal has yet to be approved by the CCM and Global Fund.	• 2018 and S1 2019 absorption analysis identified savings mainly from delayed procurements (including the reproduction of data collection tools)

Annex 3. Global Fund and country contextual facilitators and barriers to grant implementation

Global Fund Business Model factors helping or hindering grant implementation	
Helping Factors (Facilitators)	**Hindering Factors (Barriers)**
- Significant support from the CT (which is not typical for most country portfolios) through frequent country visits, including enhanced engagement at the sub-national level through the Provincial Approach pilot. - Bi-annual Global Fund program reviews and annual reviews at the province-level. - Flexibility in disbursement of funds to avoid disruption of grant implementation (e.g. provision of a 1-month buffer). - Flexibility to conduct program revisions/ reprogramming as frequently as needed.	- Frequent revisions in activities and strategies due to budget revisions through various mechanisms (e.g. portfolio optimization, program revision/reprogramming, and budget revision/reallocation). - Lack of clarity regarding the revision process for matching funds in which funds may only be reprogrammed toward activities supporting the same catalytic priorities.

Mixed Factors
New implementation arrangements   - Transversal SRs have helped streamline grant implementation at the sub-national level but weak coordination between TB/HIV and malaria PRs had consequences on grant implementation in 2018. The situation improved in 2019 with the establishment of monthly coordination meetings between civil society PRs and the MoH to better monitor and coordinate SR activities.   - Mutualized distribution of health products by CDRs has achieved certain efficiencies but coordination among actors remains challenging.

Country contextual factors helping or hindering grant implementation	
Helping Factors (Facilitators)	**Hindering Factors (Barriers)**
- CCM engaged in resolving implementation bottlenecks that are outside of PR control. - Installment of Tom2pro (financial management and accounting system) at the central level and in certain provinces. - Updated data collection tools for entry of routine data in DHIS2.	- Weak coordination and communication between government and civil society PRs and between PRs and SRs, affecting implementation of activities that are sequential or dependent on one another. - Weak accountability and poor dissemination of information from the national to subnational level. - Bureaucratic government procurement processes. - Weak financial management capacity and improper application of financial procedures leading to delays in disbursements.

Annex 4. Health Systems Modelling

Background

The PCE developed a novel evaluation tool referred to as a Health Systems Model. While the concept of Health Systems Modelling (HSM) has been established in the academic literature, it has not to our knowledge been applied as part of a prospective evaluation.(25) The PCE has applied HSM in five instances now, and used it to serve several simultaneous purposes:

- Identification of potential bottlenecks in program implementation
- Statistical measurement of technical efficiency, defined as activity or output per dollar
- Statistical measurement of implementation effectiveness, defined as the translation of outputs to outcomes
- Examination of subnational patterns in implementation effectiveness
- Counterfactual analysis of impact, defined as the expected level of incidence and mortality under a certain level of financial input

In DRC, HSM was used to explore several of these topics for malaria.

The HSM approach adopted by the PCE has been less methodologically robust than the HSM approaches defined in academic literature. This was motivated by the prospective and use-focused nature of the PCE itself, as well as the multiple, competing objectives of the PCE. As such, several important model limitations (data quality limitations notwithstanding) must be noted and are described below. The purpose of HSM in the PCE is to serve as one of many tools to learn about how grants contribute to the national programs and to lend evidence-based guidance to other evaluation approaches. Thus, the HSM should not be seen as a stand-alone product, but rather a component of a larger evaluation product.

Results Chain Conceptual Framework

Before applying any statistical models, the PCE first developed a theoretical model of how health systems in each country translate financial and other inputs into health outcomes. Using an interactive online tool, the PCE drew from its diverse group of in-country and international experts to diagram the "results chain", or sequence of related pathways by which inputs become activities, activities become outputs, outputs become outcomes and outcomes become impact.(26) This framework detailed both the theoretical constructs along each pathway as well as lists of potentially-measurable indicators within each construct. One framework was developed for each of the three diseases (HIV, TB and malaria) and was reviewed and validated by experts from all eight PCE country evaluation partners, by the five global evaluation partners and select members of the Global Fund. Results chain development was conducted in a series of in-person workshops and subsequent online collaboration.

Data Sources

Once the conceptual frameworks were developed, the PCE teams collated data from all available sources in order to "populate" as many elements of the results chain with empirical indicators as possible. A separate exercise was carried out in each country to map data sources to indicators in the results chains.

Based on data access, availability, completeness, quality and feasibility, five cases were selected to pilot HSM: malaria in the Democratic Republic of the Congo (DRC), TB in Guatemala, TB in Senegal, HIV in Cambodia and HIV in Mozambique.

The models have varied in specific data sources, but generally rely on Global Fund data systems to track expenditure of Global Fund investments, OECD data systems to track expenditure of other donor investments, national health accounts to track government expenditure and national program data to track health systems activities, outputs and outcomes. A complete list of indicators and data sources for DRC is provided below.

Data Processing

Several data processing steps were carried out in order to a) ensure standardization of indicators to enable modelling and b) correct for known data quality limitations.

All indicators were extracted from their original data system (excel spreadsheets, online dashboards, etc.) using standardized scripts written in the R statistical programming language to ensure reproducibility. In some cases, indicators were available at different levels of geographic and temporal aggregation (for example, indicators from DHIS2 were available by facility, but indicators from national program data systems were available by health zone). After identifying all available indicators, modelling teams determined the most granular level of aggregation that was possible for a majority of indicators. Where necessary, indicators were then aggregated or disaggregated to that level. To disaggregate by geography, indicators were divided in proportion to the subsequent indicator in the results chain. To disaggregate temporally, log-linear interpolation was used, with the available data assumed to reflect the midpoint of its respective time period.

All data were then systematically corrected for missing values and outliers. We used a combination of visual examination and quantile regression to screen for extreme values, and a combination of the expectation-maximization algorithm and generalized linear models to impute missing values (including those created by outlier screening).(27)

Data transformations were applied prior to fitting each model. All rate variables were log-transformed and all proportion variables were logit-transformed to ensure univariate-normal distributions. Count variables were cumulative-summed over their available time series (starting from the first date in their time series, even if other indicators were only available for a shorter period) to more accurately reflect financial processes according to theory. Six-month time lags were applied to each financial variable to ensure a more realistic temporal relationship between inputs and activities, and six-month leads were applied to treatment success variables to ensure a more realistic temporal relationship between treatment initiation and completion.

Additional corrections were applied specifically for DRC. all estimates were statistically adjusted for population change and reporting completeness by including these as control variables in all model equations. A "cross-walking" procedure was also applied to retain the short-term temporal variance of program data while relying on model estimates of population-level intervention coverage.

Statistical Methods

Structural equation modelling was selected as the primary statistical method. This was employed in DRC using a Bayesian framework that allowed for multiple distributional assumptions in the same model. Weakly-informative priors were used in all equations, relying on normally-distributed priors or gamma-distributed priors depending on the theoretical relationship between each explanatory variable and outcome variable. Correlated error terms were used to represent non-directional theoretical relationships, for example between different funding sources for the same intervention. Health zone "fixed effects" were employed across the entire model (i.e. model coefficients were estimated for every health zone; national graphs represent the average coefficient) to control for geographical confounding. For purposes of feasibility, the DRC model was fit in two separate models; one representing the results chain up to the level of outputs, and a second representing the results chain thereafter.

In all, the model amounted to a system of 15 regression equations. For example, a single equation from the model might be:

Number of LLINs distributed to health zones$_{it}$ ~ Global Fund expenditure on mass ITN campaigns$_{it}$ + Global Fund expenditure on continuous ITN distribution$_{it}$ + other donor expenditure on ITN distribution$_{it}$

Where the above indicators are measured for each health zone (i) and quarter (t). Regression coefficients were expressed on a z-standardized scale, thereby reflecting the expected standard deviation change in a particular outcome variable associated with a one standard deviation change in a particular explanatory variable.

Sensitivity analyses were conducted to explore the effect of using simultaneous versus unrelated equations, and the effect of including or excluding completeness and population control variables.

Model Limitations

As mentioned above, there are several methodological limitations to the HSM approach used in the PCE, the most noteworthy of which (though not necessarily all) are listed here. Each of the below issues limit the validity with which our HSM reflects the "true" results chain.

Static model: The structural equation modelling approach selected for this analysis does not incorporate dynamic effects of any explanatory variable on its subsequent outcome variable. In other words, each coefficient is estimated as an average across the time series of available data and is assumed to be constant over time. In addition, no features were added to the model to account for the reality of declining marginal returns associated with approaching saturated coverage of certain interventions.

Simplification of conceptual framework: As described above, the PCE team developed a theoretical conceptual framework of the results chain, detailing all relevant constructs and indicators involved in national programs. Due to data availability, and for the purposes of feasibly developing a model in a timely manner, many of the indicators in the theoretical model were not included in the statistical model. In some instances, this may have led to important gaps between adjacent indicators, leaving some pathways only superficially-represented

Uniform lagged effects: As described above, the PCE implemented 6-month lags between expenditure and activities/outputs. The purpose of this is to more realistically reflect the time delays inherent to national programs, but it is necessarily a simplification. In reality, there may be variable lags depending on the intervention, geography or other factors, but this model assumed constant lag terms throughout.

Level of disaggregation: Most of the financial inputs variables have been aggregated for the purposes of feasibility and interpretability of the model results. For example, all facility-based treatment expenditures were summed together to form a single variable in the model, when in reality this "module" in the Global Fund and other budgets is comprised of many separate activities. Furthermore, data availability constraints led us to include variables for government health expenditure that were not disaggregated by intervention at all, instead reflecting overall spending on malaria.

Sociodemographic confounding: Many -possibly innumerable- factors from outside of the health system (health behavior, access to services, perceptions, economic conditions etc.) are not reflected in this model. While many linkages, such as the linkage between supply chain shipment of a commodity and in-facility utilization of it, may be assumed to be unaffected by changes in sociodemographic variables, others, such as the linkage between coverage of services and changes in burden of disease, are inarguably confounded. This limits our ability to reliably measure those aspects of the results chain. Importantly this pertains to the final linkage between outcomes and impact in the results chain. Without further theory-development, data and modelling, the PCE elected to exclude this final linkage from the model.

Results

Health Systems Model

The full model results are displayed in diagram form in Figure 1 and 2. The strongest model coefficients were generally observed between activities and outputs, indicating a strong effect of commodity shipment on commodity utilization. For example, the strongest pathway in Figure 1 below connects RDTs received (activity) with RDTs used (output). This coefficient has a value of 0.43 (95% confidence interval 0.21-0.65), meaning per single standard deviation increase in RDT activity, we have observed a 0.43 standard deviation increase in RDT output, controlling for other factors. Weaker coefficients were observed generally between inputs and activities, which indicates both that a) there is further complexity (e.g. different time lags or further disaggregation of inputs) in the actual health system that is not reflected in the model, and b) financial expenditure may have a measurably weaker effect on activities than activities do on outputs.

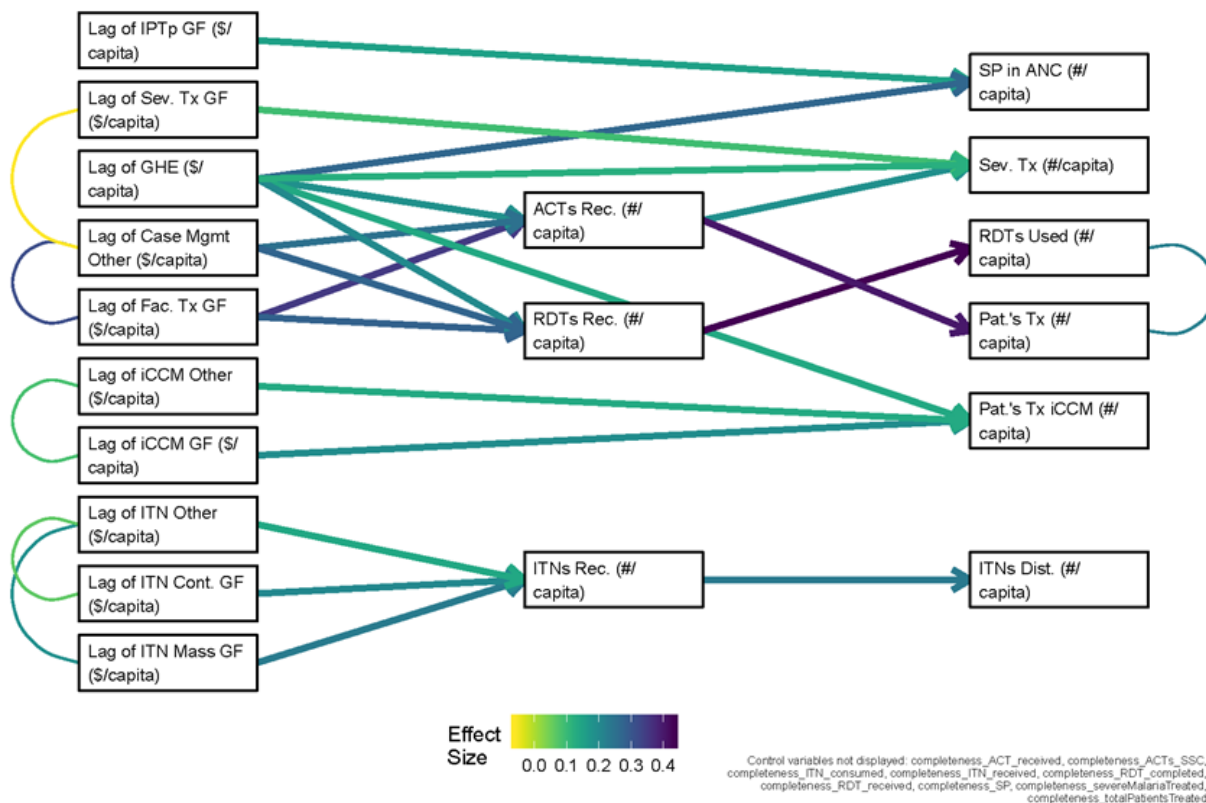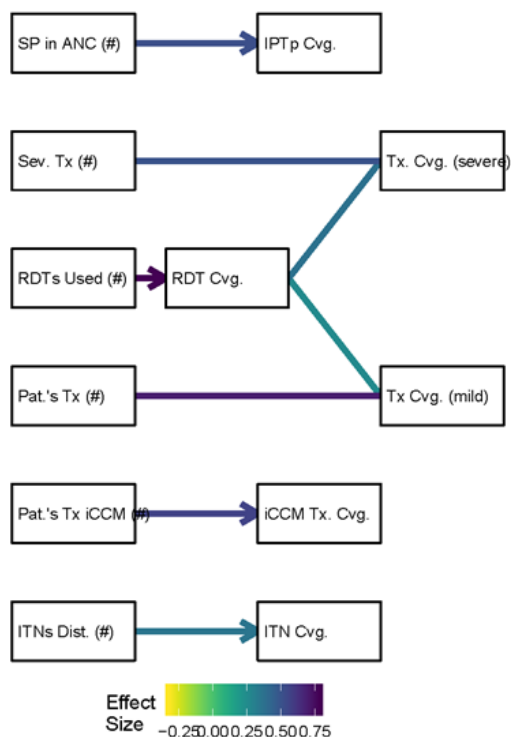**Figure 1. Results of health systems model, inputs, activities and outputs**

Figure 2. Results of health systems model, outputs and outcomes
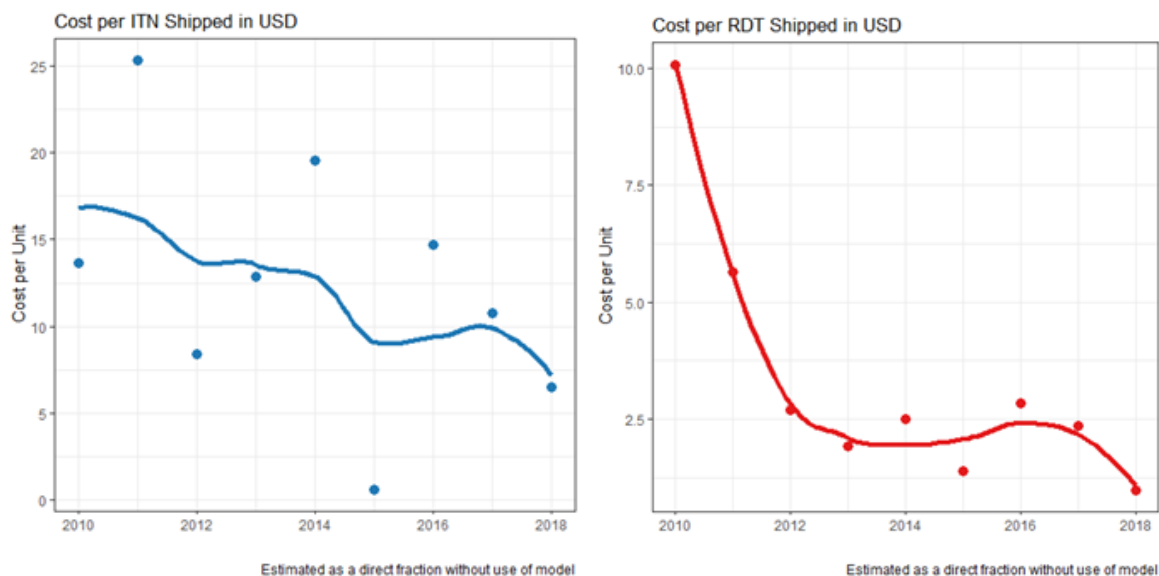

Efficiency

Examining the pooled data about Global Fund, government and other donor expenditure by activity, and combining it with supply chain data from the national program, an encouraging trend emerges (Figure 3). The average ratio of LLIN investment to LLIN output (units shipped to health zones) has fallen from approximately

US$17 per LLIN in 2010 to US$7 per LLIN in 2018. The ratio of RDT investment to RDT output declined from US$10 per RDT in 2010 to less than US$3 per RDT in 2012, and has remained more or less stable since then. Notably, the average ratio of investment in ACTs per ACT shipped to health zones (not shown) has remained more stable over the time series; it actually increased from approximately US$1 per ACT to US$1.50 per ACT between 2010 and 2014, then declined to less than US$0.50 per ACT shipped by 2018.

Taking into account the entire program investment and possible sources of statistical confounding, our best estimate of the cost to ship one LLIN is US$9.95 (95% confidence interval: US$5.68 - US$40.12). Our best estimate of the cost to ship one RDT is US$3.04 (95% confidence interval: US$1.73 - US$12.83). Our best estimate of the cost to ship one ACT is US$1.56 (95% confidence interval: US$0.88 - US$6.74) These estimates take into account the wide subnational variation in output, which contributes to uncertainty, and represent an average over the 8-year time period shown in the figures above.

Figure 3. Trends in cost per ITN shipped to health zones, cost per RDT shipped to health zones, 2010-2018

Effectiveness

The final coefficients in the model can be used to measure "implementation effectiveness", or the extent to which population coverage of an intervention has changed per additional output delivered. For example, the model estimates that for each additional ITN distributed through either continuous distribution or mass campaigns, only 0.395 (95% confidence interval 0.174 - 0.617) additional household members have reported actually sleeping under an ITN. In the model diagram, this equates to a standardized coefficient of 0.36 (95% confidence interval: 0.15-0.57). The effect of ITN distribution is comparatively lower than the effect of treatment delivery, either through community case management (estimate: 0.56, 95% confidence interval: 0.22-0.90) or in-facility, either severe (estimate: 0.5, 95% confidence interval: 0.07-0.93) or uncomplicated malaria (estimate: 0.70, 95% confidence interval: 0.34-1.06). This indicates that case management outputs translate into treatment coverage more effectively than ITN outputs.

Similarly, the weakest coefficients in the model may indicate program bottlenecks. Examination of Figures 1 and 2 above reveals that the two pathways leading to severe treatment outputs (from Global Fund spending on treatment of severe malaria and from government health expenditure) are the two weakest relationships in the entire model. As noted above, this may indicate that this section of the model is most critically flawed by the aforementioned limitations, but it may also indicate the existence of a health system barrier related to treatment of severe malaria. Further evaluation may consider treatment of severe malaria as a candidate for investigation.

Variables Included in Model

Group	Label in Diagram	Definition
Inputs	Lag of ITN Mass GF ($)	Global Fund expenditure on ITN mass campaigns, ("lag" meaning six months prior to activities indicators)
Inputs	Lag of ITN Cont. GF ($)	Global Fund expenditure on ITN continuous distribution, ("lag" meaning six months prior to activities indicators)
Inputs	Lag of ITN Other ($)	Other donor disbursement on ITN distribution, ("lag" meaning six months prior to activities indicators)
Inputs	Lag of Fac. Tx GF ($)	Global Fund expenditure on facility-based case management of malaria, ("lag" meaning six months prior to activities indicators)
Inputs	Lag of Case Mgmt Other ($)	Other donor disbursement on facility-based case management of malaria, ("lag" meaning six months prior to activities indicators)
Inputs	Lag of iCCM GF ($)	Global Fund expenditure on integrated community case management, ("lag" meaning six months prior to activities indicators)
Inputs	Lag of iCCM Other ($)	Other donor disbursement on integrated community case management, ("lag" meaning six months prior to activities indicators)
Inputs	Lag of GHE ($)	Government health expenditure on malaria in general, ("lag" meaning six months prior to activities indicators)
Inputs	Lag of Sev. Tx GF ($)	Global Fund expenditure on facility-base case management of severe malaria, ("lag" meaning six months prior to activities indicators)
Inputs	Lag of IPTp GF ($)	Global Fund expenditure on intermittent preventive treatment during pregnancy (IPTp), ("lag" meaning six months prior to activities indicators)
Activities	ITNs Rec. (#)	Number of insecticide-treated nets received (i.e. shipped from central to health zone level)
Activities	RDTs Rec. (#)	Number of rapid diagnostic tests received (i.e. shipped from central to health zone level)
Activities	ACTs Rec. (#)	Number of individual units of artemisinin combination therapy received (i.e. shipped from central to health zone level)
Outputs	ITNs Dist. (#)	Number of insecticide-treated nets distributed (i.e. given to people)
Outputs	RDTs Used (#)	Number of rapid diagnostic tests conducted
Outputs	Pat.'s Tx iCCM (#)	Number of patients with malaria treated in community care settings
Outputs	Pat.'s Tx (#)	Number of patients with uncomplicated malaria treated in facilities
Outputs	Sev. Tx (#)	Number of patients with severe malaria treated in facilities
Outputs	SP in ANC (#)	Number of patients treated with sulfadoxine-pyrimethamine (SP) in antenatal care (ANC) (any visit)
Outcomes	iCCM Tx. Cvg.	Proportion of suspected cases of malaria treated in community care settings

Outcomes	Tx Cvg. (mild)	Proportion of population-level cases of uncomplicated malaria treated with effective antimalarials
Outcomes	RDT Cvg.	Proportion of population-level cases of malaria tested with rapid diagnostic tests
Outcomes	Tx. Cvg. (severe)	Proportion of population-level cases of severe malaria treated with effective antimalarials
Outcomes	ITN Cvg.	Proportion of population who slept under insecticide-treated nets in the previous night
Outcomes	IPTp Cvg.	Proportion of antenatal care visits (1st visit) in which sulfadoxine-pyrimethamine was administered

Table of Data Sources

Model	Indicator Group	Data Source	Years	Level of Granularity		Intervention Details
				Temporal	Spatial	
All Models	Global Fund expenditure	Global Fund Grant Operating System (GOS)[1]	2003-2015	Quarter	National	34 intervention categories
All Models	Global Fund expenditure	Global Fund Progress Updates (PR reports)[2]	2015-2018	Quarter	National	34 intervention categories
All Models	Disbursement by other donors	IHME Health Fin. (OECD CRS/DAC Databases)[3]	1990-2017	Year	National	10 intervention categories
All Models	Government expenditure	IHME Health Fin. (National Health Accounts)[4]	2000-2017	Year	National	General malaria spending
DRC Malaria	Commodity shipment, distribution, case/death notifications	National Malaria Program[5]	2010-2018	Month	Admin 2	ITNs, RDTs, antimalarials (by type and service location)
DRC Malaria	Commodity availability and distribution, case/death notifications	DHIS2[6]	2018-2019	Month	Facility	ITNs, RDTs, antimalarials (by type and service location)
DRC Malaria	Intervention coverage, burden of disease	Malaria Atlas Project[7,8]	2010-2017	Year	5x5 kilometer	ACT coverage among children, ITN coverage in previous night

1. The Global Fund to Fight AIDS, TB and Malaria. Internal Databases. 2018

2. The Global Fund to Fight AIDS, TB and Malaria. Progress Update and Disbursement Request Tool. 2019

3. Institute for Health Metrics and Evaluation (IHME). Financing Global Health 2018: Countries and Programs in Transition. Seattle, WA: IHME, 2019.

4. Micah AE, Chen CS, Zlavog BS, et al Trends and drivers of government health spending in sub-Saharan Africa, 1995–2015 BMJ Global Health 2019

5. Programme National de Lutte contre le Paludisme (PNLP). Routine Monitoring and Evaluation Data. 2018

6. https://snisrdc.com/dhis-web-commons/security/login.action

7. Bhatt S., Weiss DJ., Cameron E., et al. The effect of malaria control on Plasmodium falciparum in Africa between 2000 and 2015 Nature. 2015

8. Weiss DJ, Lucas TCD, Nguyen M, et al. Mapping the global prevalence, incidence, and mortality of Plasmodium falciparum, 2000–17: a spatial and temporal modelling study. Lancet 2019; published online June 19.

Annex 5. Supporting analyses

Table 1. DRC 2018-2020 grant budgets referenced in the report, not including additional funds from Portfolio Optimization and Debt-to-Health.

Grant	Grant Period	File Name	Budget Total
COD-C-CORDAID	2018-2020	COD_C_CORDAID_Budget 2018-2020 avec SRs 16_01_19 VF Groupe B.G	$149,742,259.00
COD-H-MOH	2018-2020	1c.COD_H_MOH_budget_27Feb2018	$ 23,913,524.00
COD-T-MOH	2018-2020	1c.COD-T-MOH_budget_27Feb2018	$ 18,679,294.00
COD-M-SANRU	2018-2020	1c.COD-M-SANRU_Budget_IL1_20.08.2018	$275,717,435.00
COD-M-MOH	2018-2020	1c. COD-M-MOH_Budget_IL1_08Aug2018_signedoff	$ 74,908,613.00