TANZANIA HIV INVESTMENT CASE 2.0
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PHAROS GLOBAL HEALTH ADVISORS AND AVENIR HEALTH

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LIST OF ACRONYMS

ABYM	Adolescent boys young men
AGYW	Adolescent girl young women
ATF	AIDS Trust Fund
ART	Antiretroviral therapy
BCC	Behavior change communication
CC	Constant Coverage Scenario
COP	Country Operational Plan
DREAMS	Determined, Resilient, Empowered, AIDS-free, Mentored, and Safe women
DSDM	Differentiated service delivery models
EID	Early infant diagnosis
FL	First line ARVs
FSW	Female sex worker
HR	Human resources
HSHSP	Health Sector HIV Strategic Plan
HTC	HIV testing and counseling
HTS	HIV testing services
IC 1.0	Investment case 1.0 (2016)
IDU	Injection drug use
MoHCDGEC	Ministry of Health, Community Development, Gender, and Elderly, and Children
MSM	Men who have sex with men
NIMART	Nurse-Initiated management of antiretroviral therapy
NACP	National AIDS Control Program
NASA	National AIDS Spending Assessment
NS	National Strategy Scenario
NHIF	National Health Insurance Fund
NMSF IV	National Multisectoral Strategic Framework IV
O-CCF	Optimization- Constant Coverage Funding Scenario
O-DDF	Optimization- Declining Donor Funding Scenario
O-DRM	Optimization- Domestic Resource Mobilization Scenario
PEPFAR	President's Emergency Plan for AIDS Relief
PHIA	Population HIV Impact Assessment
PITC	Provider-initiated testing and counseling

PLHIV	People living with HIV
PMTCT	Prevention of mother to child transmission
PrEP	Pre-exposure prophylaxis
PWID	People who inject drugs
TACAIDS	Tanzania Commission for AIDS
TB	Tuberculosis
TE	Technical efficiency
THIS	Tanzania HIV Impact Survey (PHIA)
SIB	Social Impact Bond
SNU	Sub-national units
SID	Sustainability index and dashboard
STI	Sexually transmitted infection
VCT	Voluntary counseling and testing
VMMC	Voluntary male medical circumcision

Executive Summary

Introduction

Over the past 20 years, Tanzania has achieved great progress in reversing the trends of the HIV epidemic and advancing toward national and global goals. In 2009, only 22% of people living with HIV (PLHIV) were on ART, and over the past decade coverage tripled to 57% in 2017 (TACAIDS and UNAIDS 2016; UNAIDS 2018). New infections have also declined during this time frame, from 120,000 annually in 2000 to 65,000 in 2017. Looking ahead to 2030, Tanzania has committed to reaching epidemic control and achieving Fast Track and 95-95-95 targets. To meet these goals, the national program will have to address significant challenges and overcome new constraints. Despite high coverage of ART for PLHIV who know their status at 94%, only 61% of PLHIV are aware of their status. This shortfall on the first 90 not only means that testing coverage and yield will have to be improved, but the absolute number of PLHIV on ART will have to increase by approximately 450,000 to reach the 95-95-95 targets. Growing these volumes will have to be done under a shifting financing context. The HIV financing outlook is also worrisome: following significant increases from 2015-17 to an amount of over USD 600 M annually – with 90% of this coming from external sources -- donors are now signaling that their contributions have hit a ceiling and will decline. Domestic financial contributions have not been rising, either. Progress towards national goals may have to be achieved without more money for HIV, potentially with less.

Figure 0-1. HIV expenditure 2015-2017 and 2018-2020 available funding
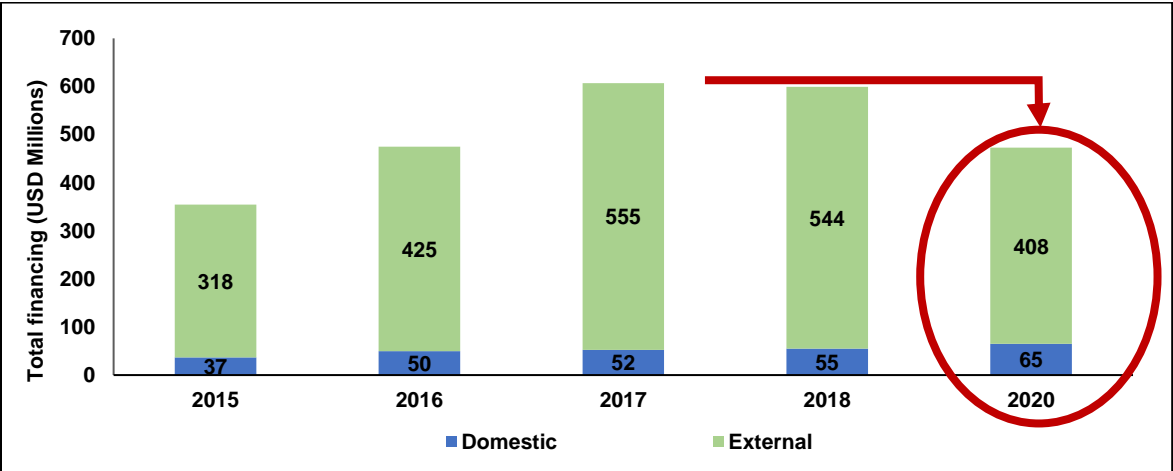
Objective of IC 2.0

An investment case framework was first adopted in Tanzania in 2015. Published in 2016, around the launch of the Fast Track targets, this "Investment Case 1.0" put forward a vision for greatly expanded funding of the national response. This Investment Case 1.0 has been a guiding document for the response and has informed the most recent national strategies (NMSF IV and HSHSP IV). But a shifting funding landscape coupled with persistent program gaps for reaching Fast Track and 95-95-95 targets call for an update to the Investment Case to better reflect current conditions.

The objective of Investment Case 2.0 is to create a common country-led vision of what is needed to confront these program and financing challenges in the years ahead by defining what the key investment decisions are; estimating the magnitude of resources required; and assessing implications for government and donor resource mobilization. This analysis is meant to drive harmonized decisions by the Government of Tanzania and its principal partners, especially PEPFAR and the Global Fund. To do this,

the Investment Case 2.0 puts forward a series of scenarios that capture the future possibilities for the national program, and uses these scenarios to estimate impact on the HIV epidemic and to explore various combinations of domestic and external financing.

IC 2.0 methodology and scenarios

The investment case methodology is based on modeling and analysis of defined scenarios, comparing various "futures" for the HIV response in Tanzania and assessing their benefits, costs, trade-offs, and financing requirements. IC 2.0 uses well known software developed by Avenir Health (Spectrum epidemiological estimates and projections, GOALS and AIM, plus new Goals updates related to HIV testing and services for adolescent girls and young women). In this report, five scenarios -- two target-driven and three resource-constrained – are explored in-depth and compared to one another. The scenarios include:

- Constant Coverage (CC)
- National Strategy (NS)
- Optimization (with) Constant Coverage Funding (O-CCF)
- Optimization (with) Declining Donor Funds (O-DDF)
- Optimization (with) Domestic Resource Mobilization (O-DRM)

The investment case starts by examining the **Constant Coverage scenario** (CC), a coverage-driven scenario in which ART coverage is maintained at current levels. CC is deliberately presented as a pessimistic scenario in which the national response stalls – it shows the costs and consequences of failing to take the response to a higher level.

The **National Strategy** goals scenario (NS) uses the ambitious targets contained in Tanzania's National Multisectoral Strategic Framework IV and Health Sector HIV Strategic Plan IV. The NS assumes that there is no reallocation across services or other efficiency gains, and thus generates a very high price tag. In this sense, NS is similar to the modeling done for IC 1.0, which was carried out at a time when external financing for HIV in Tanzania was rising. The additional impact and associated large funding gap are estimated.

Thus, IC 2.0 explores three additional funding-constrained scenarios under best- and worst-case assumptions, to see how close Tanzania can get to its national HIV goals by optimizing the use of available funding.

In each of these funding-constrained scenarios, the available funding resource envelope is optimized by prioritizing (allocative efficiency) across prevention interventions and implementing technical efficiencies in ART delivery.

Given that PEPFAR and Global Fund have indicated that it is unlikely their financial contributions to Tanzania will increase in the future, the best-case scenario assumes that external and domestic funding would at least be maintained at levels required to keep Constant ART Coverage for 2019-2030 (**Optimization with Constant Coverage Funding**, O-CCF).

The worst-case scenario assumes that donor funds will continue to decline and domestic financing will not increase, generating the smallest benefit in fighting HIV and AIDS, creating the largest funding gap. This reduced funding envelope (**Optimization with Declining Donor Funds**, O-DFF) is stretched as far as possible but still achieves limited results.

The third funding-constrained scenario is a hybrid of the other two, in which external financing declines but is partially offset by gradually increasing domestic financial outlays, depicting a situation where the government steps into the breach by mobilizing more national funds (**Optimization with Domestic Resource Mobilization**, O-DRM).

Under these tight funding scenarios, the future of the Tanzania HIV response will depend on the ability of the national program to adapt and become more efficient with available funds, by allocating resources to interventions that achieve the greatest impact per dollar spent and by finding ways to deliver critical interventions at a lower unit cost.

Prevention activities absorb about 15% of current HIV expenditure in Tanzania. Prioritization of prevention interventions was assessed based on cost per infection averted to determine the mix of interventions that would maximize the number of infections averted per dollar spent. Based on Tanzania's local context and costs, condoms, VMMC, FSW, MSM, and BCC interventions were found to be the most cost-effective. If a greater share of prevention resources was allocated towards these interventions, more infections could be averted for available prevention funding.

For efficiency in ART delivery, three policy shifts were identified to have additional potential for significant cost savings. Some of these policies are already being implemented and must be scaled, while other policies have political support and evidence of cost savings but have not been introduced yet. Key technical efficiencies including: scaling Dolutegravir (DTG)-based ARV regimens; achieving full implementation of simplified lab testing algorithm for stable patients; and introducing community-based support services for ART. When fully implemented, these efficiencies could save USD 50 per PLHIV on ART, reducing ART costs by approximately 25% and generating as much as USD 50 M annually in savings.

Currently, annual expenditure on HIV testing and counseling is about USD 50 M, and only about 61% of PLHIV are aware of their status. The IC 2.0 efficiency analysis suggests that it is possible for Tanzania to reach the 90% target for PLHIV who are aware of their status by 2025 and spend even less than today. This more efficient strategy would involve focusing on scaling up PITC, VCT, and self-testing through 2022 and then keeping PITC and self-testing volumes high when VCT scales back in 2022. Until 2022, volumes of PITC and self-testing should be about 3-4 million tests and VCT at 800,000 annually. After VCT scale down, PITC and self-testing volumes would need to reach 4-5 million tests annually. This strategy would cost less than USD 40 M annually, saving at least 10-15 M annually compared to the current strategy.

Results

Current Coverage Scenario

Under the CC scenario, ART coverage would stay constant, the level of new infections would remain stagnant and AIDS-related deaths would increase from 28,000 deaths annually in 2019 to 39,000 annually in 2030. Tanzania would see only a 55% reduction in new infections and a 53% reduction in AIDS-related deaths from 2010-2030, resulting in major shortfalls in pursuit of Fast Track targets.

National Strategy Scenario

The National Strategy, as defined in the NMSF IV and HSHSP IV, would nearly achieve Fast Track goals with 85% reduction in new infections and 83% reduction in AIDS deaths by 2030, versus the 2010 baseline. The CC would lead to 255,000 fewer infections and 188,000 fewer AIDS-deaths from 2019-2030 compared to the CC. In 2030, the NS would see 30,000 fewer infections (*Figure 0-2*) and 35,000 fewer AIDS-related deaths in comparison to the CC (*Figure 0-3*).

Figure 0-2. New infections of CC vs NS 2019-2030

Figure 0-3. AIDS-deaths of CC vs NS 2019-2030
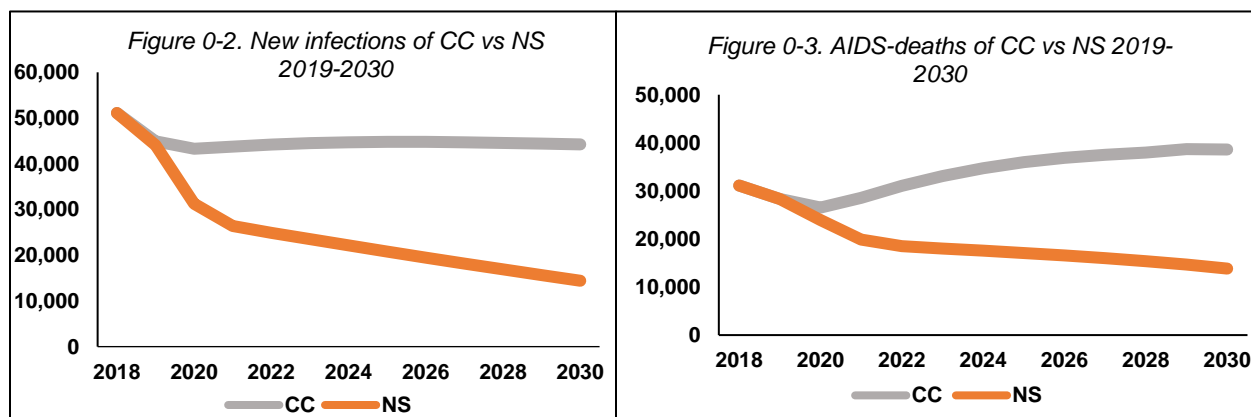
However, the cumulative cost of the NS would be USD 8.1 B from 2019 to 2030, 40% higher than the cost of Constant Coverage. By 2030, the annual resource needs of the HIV program would reach USD 839 M, almost twice current spending *(Figure 0-4)*. The funding gap between the CC and NS would increase from USD 48 M in 2019 to 339 M in 2030.

Figure 0-4. Cumulative and 2030 resource needs of CC and NS

	CC	NS
Cumulative resource needs 2019-2030 (USD M)	5,783	8,097
Resource needs in 2030 (USD M)	500	839

The impact that would could be achieved by implementing the National Strategy would prevent hundreds of thousands of new infections and deaths -- if it could be financed. But the resource needs for the National Strategy are very high and may not be feasible, given Tanzania's HIV financing outlook.

Optimization of Constant Coverage Funding

If the funds for maintaining Constant Coverage were further optimized through implementing the allocative and technical efficiency approaches at scale, O-CCF would help avert 243,000 more infections and 180,000 fewer deaths as compared with Constant Coverage, thus achieving the same impact as the National Strategy for USD 2.5 B less. This shows the tremendous power of achieving optimization at scale, if implemented, and how the NS could be optimized further to reduce the price tag of its important impacts (*Figure 0-5*).

Figure 0-5. Comparison of new infections, AIDs-related deaths, ART coverage, and resource needs for CC, NS, and O-CCF scenarios

	Constant Coverage	National Strategy	Optimization with Constant Coverage Funding
New infections (All adults)			
Cumulative new infections 2019-2030	533,000	278,000	290,000
Number of new infections in 2030	44,000	14,000	16,000
Fast Track target (Percent reduction 2010-2030)	-55%	-85%	-84%
AIDS-related deaths			
Cumulative deaths 2019-2030	408,000	220,000	220,000
AIDS-related deaths in 2030	39,000	14,000	14,000
Fast Track target (Percent reduction 2010-2030)	-53%	-83%	-83%
Number on ART			
Number on ART in 2030	1.10 Million (68% of PLHIV)	1.34 Million (87% of PLHIV)	1.35 Million (87% of PLHIVV)
Resources (USD M)			
Cumulative resources 2019-2030	5,783	8,097	5,461
Required resources in 2030	500	839	463

Optimization - Declining Donor Funds

Based on the announced PEPFAR cuts for 2020 and on discussions with the Global Fund, the most pessimistic scenario assumes that funding from donors declines at a gradual pace (Global Fund funding by 10% and PEPFAR by 15% every 3 years) and that financing by the Tanzania Government remains flat. As a result, modeling suggests that new infections would increase by 7% and AIDS-related deaths by 24% during 2019-2030 (*Figures 0-6 and 0-7*). ART coverage (as a share of PLHIV) would drop to 65% as a result of new infections and longer life expectancy for those already on ART. This reversal of recent progress would occur even with efforts to optimize.

Figure 0-6. New infections 2019-2030

Figure 0-7. AIDS-related deaths 2019-2030
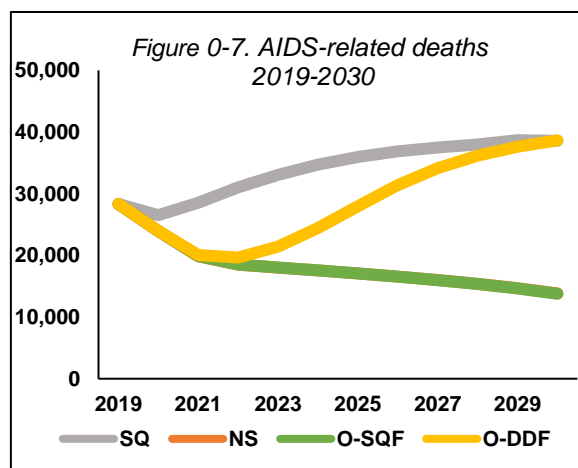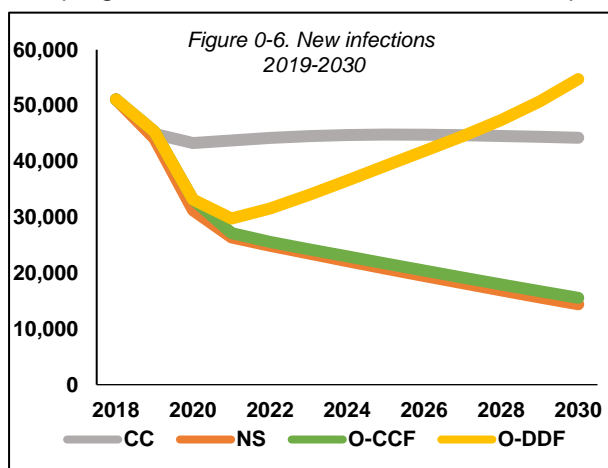
Optimization with Domestic Resource Mobilization

If donor funds decrease in the coming years, domestic resource mobilization becomes pivotal to safeguard the gains achieved in the national HIV response and keep Tanzania moving toward its 2030 goals. Based on a detailed fiscal space analysis conducted for IC 2.0, it was estimated that the

Government could feasibly mobilize an additional USD 10-15 M a year each year from now to 2030, from a combination of MOH budget increases, national health insurance resources, and special HIV Fund levies. This pace of domestic resource mobilization driving public funds from USD 55 million in 2018 to USD 174 million by 2030 (*Figure 0-8*) could offset possible projected declines in donor funding and maintain annual HIV funding at close to Constant Coverage scenario levels (even though under this scenario Tanzania would still only cover about 40% of total HIV spending from domestic sources in 2030, with continuing high dependence on donors).

Figure 0-8. Estimated feasible amounts of domestic funding for HIV to 2030 (USD Millions), for baseline + incremental annual increases
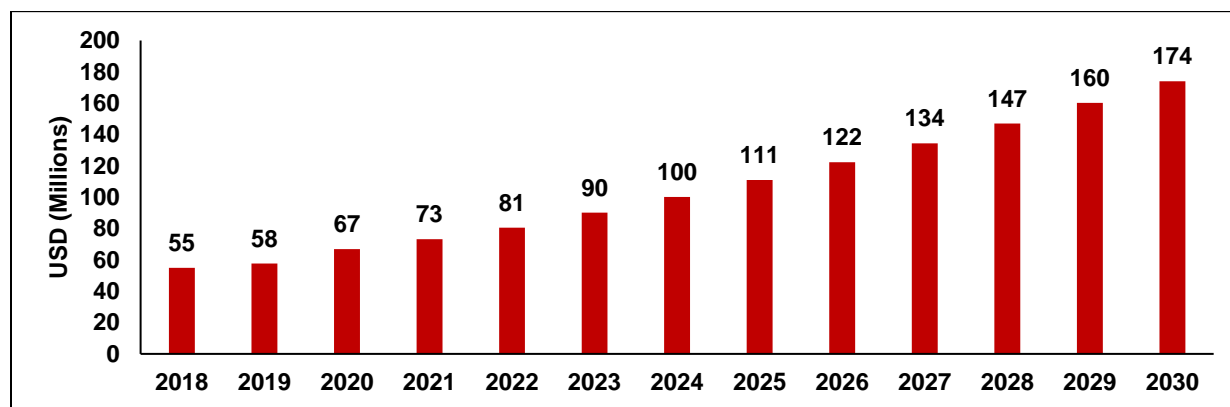
The most promising mechanisms mobilizing the level of resources required are increasing the Ministry of Health budget, executing the AIDS Trust Fund, and adding HIV services to the NHIF package of benefits.

With this amount of funding, Optimization (Optimization with Domestic Resource Mobilization) would allow Tanzania to come close to achieving its 2030 goals, even though the results would be slightly less than under the Optimization with Constant Coverage Funding (*Figure 0-9*).

Figure 0-9. Comparing scenarios: Progress towards Fast Track targets and total program costs
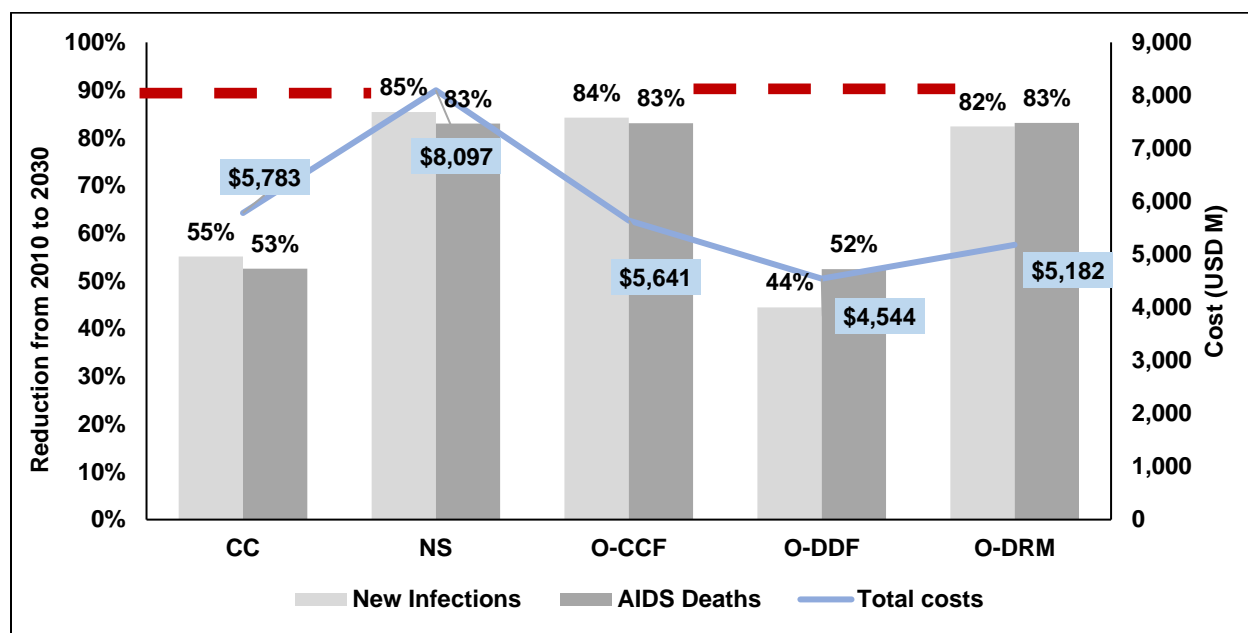
Scaling up a comprehensive prevention package for AGYW

Addressing structural roots of high risk of HIV infection among AGYW is a key challenge that to fully address will require significant funding outlays beyond current spending. The analysis in IC 2.0, which focuses on optimization of prevention spending based on cost-effectiveness within tight resource constraints, does not make it easy to justify spending on this innovative program, since it is very expensive compared to equally important but less costly prevention interventions like VMMC and condoms. Modeling for IC 2.0 suggests that a comprehensive prevention package for AGYW would cost USD 150 M annually in 2020 and would rise to USD 275 M by 2030 – more than half of what Tanzania is currently spending in total to fight AIDS. It is difficult to see where these additional funds would come from. However, given the long-run payoffs from protecting adolescent girls and young women from HIV infection, extra investments in these areas may be justified. Particularly in the case of AGYW, where the benefits of female empowerment are wider than in HIV and health (for example, in increased girls' education and livelihoods), the extra costs of the program should be shared with other sectors and ministries.

Conclusions and recommendations

As Tanzania looks to the next decade, the challenge of confronting HIV will not be an easy one. The program is still running significantly short of its own stated goals for 2030, and reliable sources of financing are waning. More PLHIV will have to be tested and put on ART and new infections must be cut through a range of targeted prevention efforts, and there may well be less money from donors to support these efforts

As time continues to tick towards 2030, Tanzania faces stark choices. Unless significantly more money can be mobilized, the country will have to do more with existing resources and possibly with less than what is available today. The country needs to identify and adopt measures to optimize the value of every dollar spent, achieving the maximum impact in preventing new infections and putting more PLHIV on effective ART. At the same time, the Government must mobilize additional domestic funding, especially as a hedge if donor financing not only plateaus after 2019 but starts to decline further.

Optimization through prioritization of funds towards the most cost-effective interventions and the implementation of treatment-related efficiencies could enable Tanzania to come close to the goals of the National HIV Strategy even with 2018 funding-levels.

If donor funding continues to decline, the Tanzania government will have to step up to provide more domestic financing to offset these reductions. The alternative scenario, in which domestic funds stagnate at current levels, would be perilous for the country, leading to a major reversal of achievements to date and leaving Tanzania very far away from achieving its national goals A average increase of USD 10-15 M a year in national funds, which appear to be affordable given Tanzania's economic outlook would protect the country against unwanted declines in donor financing and would greatly improve long-run sustainability.

Although this challenge is difficult and daunting, Tanzania could continue to advance toward the Fast Track targets for 2030 and move to epidemic control if the country follows a dual strategy, along the lines of what is contained in IC 2.0, to (a) pursue optimization of spending (allocative and technical efficiencies) and (b) mobilize feasible levels of domestic financing. In this sense, IC 2.0 could help to promote a health policy dialogue around focusing on efficiency and greater country financial responsibility, rather than advocating for large and unrealistic amounts of extra external funding.

The main recommendations of the investment case include:

- Even in the best cases for funding, optimization of prevention and treatment programs must be pursued.
- Prevention activities should be optimized by shifting resources from less cost-effective interventions to the most cost-effective interventions. Assuming funding levels are at least maintained as would be required to maintain constant program coverage, this would entail a reallocation of USD 175 M to VMMC, condoms, and FSW prevention services over the coming decade.
- Optimization will also require that Tanzania and its donor partners commit to efficiency gains in Dolutegravir-based first-line regimens, more streamlined lab algorithms for stable patients, and community-based delivery of support services for PLHIV on ART. This could save over USD 50 million annually – 10% if what is currently being spent to fight AIDS in Tanzania.
- Implementing a more efficient testing strategy, expanding on recent efforts by government and donors to prioritize cost-effective modalities with high yield, will cost less and help close the first 90 gap, reaching 90% of PLHIV aware of their status by 2025.
- Domestic resource mobilization must be strengthened, with feasible increases of USD 10-15 M a year and a goal of reaching USD 175 M annually in domestic spending by 2030.
- Increasing the government budget to HIV, adding HIV as a benefit to the National Health Insurance Fund, and using the AIDS Trust Fund are the most promising domestic resource mobilization mechanisms.

Clearly, these changes in the composition, management, and financing of the national HIV response will be difficult to implement. If funds are to be shifted away from certain prevention services such as BCC, painful reductions in certain existing programs will need to take place. At the same time, capacity to cope with and manage effectively areas of expanded prevention such as VMMC and female sex worker services will have to be built up rapidly. The same can be said for actions to increase the efficiency of AIDS treatment and save tens of millions of dollars – this will require challenging efforts by Tanzania to change its policies and practices surrounding viral load testing and to expand community-based adherence support.

Similarly, there is no doubt that it will be hard for Tanzania to persuade its key donors to maintain their current levels of financial support, and to expand steadily the amount of domestic funding going to the national HIV program. For the former, TACAIDS and NACP will have to show strong progress toward targets for 2020 2025, and 2030, and evidence of improvements in program efficiency – and will have to hope that circumstances beyond the country's control, such as the size of Global Fund replenishments, turn out to be favorable for Tanzania.

For the latter, while there is no doubt that the USD 10-15 million a year increase in domestic public funding for HIV is affordable for Tanzania, expanded allocations for HIV will have to compete with many other health priorities such as immunization, child health, and chronic disease management and non-health priorities. Government and other advocates for HIV will thus have to make a strong case for more money from the health budget and national health insurance and for increased revenue collections in the AIDS Trust Fund. This is happening in other nearby countries such as Kenya, Uganda, and Namibia, demonstrating that this is possible in Tanzania, too.

If Tanzania does not mobilize these resources, the progress of the response to date could be jeopardized. If too little resources are available once donor funds decline, then it will be impossible to maintain and grow ART coverage. Positive trends will be reversed, and epidemic control will no longer be within sight. Given the additional lives saved and infections averted this additional investment would lead to, it is not surprising that 660 M of total domestic investment over the period to 2030 would yield an economic benefit of USD 4.3 B for Tanzania (Lamontagne et al 2019).

Thus, while it will not be easy for Tanzania to adopt and adapt to the kinds of recommendations contained in this IC 2.0 report, there is no doubt that it is within Tanzania's grasp to make these changes and enhancements to its HIV response. High level political will and hard work by program managers is

needed to make these recommendations a reality. Given the importance of protecting the large gains already achieved in the fight against AIDS, and the positive impact that further progress toward 90-90-90 and virtual elimination of HIV can have for the future of Tanzania's people, it is vital for the country to galvanize its political, human, and financial resources around the recommendations in this report and to implement them swiftly and progressively over the next few years.

CHAPTER 1. SETTING THE STAGE

Achievements and Challenge

Historical achievements of Tanzania's HIV response

Over the past fifteen years, the HIV response in Tanzania has made significant progress towards epidemic control. Today in Tanzania, there are approximately 1.6 million adults and children living with HIV (PLHIV) UNAIDS 2018). The HIV prevalence is stable at 5.0% for the population 15-64 yrs (TACAIDS and ZAC 2018), and has declined from 7.0% in 2004 (TACAIDS, NBS, and ORC Macro 2005). Incidence and mortality are also decreasing. These public health gains were achieved through scale-up of ART and effective prevention interventions such as voluntary medical male circumcision (VMMC) and prevention of mother to child transmission (PMTCT). The percentage of adult PLHIV on treatment has increased from 22% in 2009 to 57% in 2017 (TACAIDS and UNAIDS 2016; TACAIDS and ZAC 2018). Today, there about one million people on ART (UNAIDS 2018). This expansion of HIV and treatment services has saved thousands of lives, with 50% fewer deaths annually in 2017 compared to 2010 (UNAIDS 2019). Moreover, the number of new infections has decreased by nearly half, from 120,000 annually in 2000 to 65,000 in 2017 (UNAIDS 2018). These public health achievements were leveraged from donor and government investments at more than USD 250 M annually since 2005 and over USD 600 M annually in recent years.

Goals and key challenges going forward

Looking to the future, Tanzania has committed to ending the epidemic by 2030, in line with the Fast Track Targets and the SDGs. Fast Track targets call for countries to set ambitious targets for ending AIDS as a public health threat in 2030. Achieving this target is premised on countries reaching the 90-90-90 targets - 90% of people living with HIV know their HIV status and by offering HIV treatment to 90% of people who know their HIV status, 90% of people on HIV treatment achieving undetectable levels of HIV in their body (known as viral suppression) by 2020 and 95-95-95 by 2030.

The national response to achieve these goals is led by TACAIDS and the National AIDS Control Program (NACP). To drive progress, both agencies have developed ambitious strategic plans, which include the fourth National Multisectoral Strategic Framework 2018/19-2033/23 (TACAIDS 2018) and the fourth Health Sector HIV Strategic Plan 2017-2022 (NACP 2017). Both set targets in line with global goals, calling for expanding ART to 95% of all PLHIV by 2025 (95-95-95) and reducing new infections to only 15,000 annually by 2023 (TACAIDS 2018).

To ultimately achieve these ambitious targets, strategic decisions will have to be made to efficiently scale-up effective interventions and thoughtfully invest in innovations. It will be important for government, donors, and implementing partners to have a common understanding of the priority actions to accelerate progress, especially since resources are constrained.

In this regard, while Tanzania has made substantial progress in its fight against HIV and AIDS over the past decade, there are also vulnerabilities in the response that need to be addressed if the country is to advance toward the Fast Track targets and sustain its efforts over the coming years. Financing and efficiency are two of the vulnerabilities that need to be urgently addressed. Domestic financing remains a small fraction (less than 10%) of total HIV spending, and external funding from the principal sources – PEPFAR and the Global Fund – appears to be leveling off and may even fall in the coming years.

Efficiency is also reported to be sub-optimal in several areas, including HIV testing, AIDS treatment, and allocation to priority prevention activities and to certain high burden geographies within Tanzania.

An updated HIV investment case for Tanzania

The need for an updated investment case

To achieve the Fast Track targets while addressing the main issues and vulnerabilities facing Tanzania's national HIV response, the country is made a firm commitment to update of its HIV Investment Case as a key framework for uniting stakeholders around a common vision for the future and guiding decisions in allocating limited resources for maximum impact. In light of more uncertainty surrounding future financing from both domestic and external actors and lower-than-expected progress towards 95-95-95 coverage goals, TACAIDS and NACP requested from UNAIDS an updated and more tailored Investment Case to guide national policy decisions on maximizing the efficiency of these interventions within a more constrained resource environment and securing financial sustainability of the program into the future.

What is an investment case?

In 2012, UNAIDS launched the HIV Strategic Investment Framework to guide countries in allocating limited resources for maximum impact (UNAIDS 2012). The Framework is meant to be a country-led, people-centered package of investment priorities that is based upon robust analysis of the epidemiology, the current response, and the recent scientific evidence.

HIV Investment case 1.0

An investment case framework was first adopted in Tanzania in 2015. Published in 2016, around the launch of the Fast Track targets, this "Investment Case 1.0" put forward a vision for greatly expanded funding of the national response. It also examined resource allocation, exploring how prioritization of interventions and geographies could maximize the impact of the program.

Some of the main recommendations of the first investment case in Tanzania included:

- Reallocate funding to the most cost-effective interventions, including greater access to ART, VMMC, outreach to FSW, and condom programs. Almost 50% of estimated new HIV infections could be prevented by this type of strategic reallocation of planned funding.
- Adoption of the Maximum Technical Efficiency (TE) scenario through implementing community-adherence clubs, home-based ART, CHW adherence promotion and mHealth to improve ART adherence and viral suppression and several approaches to enhancing the effectiveness of primary prevention including partner testing and community testing, age targeting of VMMC, sex worker empowerment, and PMTCT Option B+.
- Mobilize a large increase in funding for HIV to pay for the Maximum scenarios that had estimated price tags of 150-200% of the estimated spending of around USD 500 M a year in 2015.

This analysis informed both current national strategies, NMSF IV and HSHSP IV documents. The Max Technical Efficiency scenario was adopted in these documents. Although the investment case focused on maximizing impact, less emphasis was placed on maximizing impact with constrained resources. At the time, both external and domestic contributions were increasing year on year and new domestic resource mobilization efforts, such as the AIDS Trust Fund (ATF), had just been launched. The maximum impact scenario in this first investment case was estimated to cost USD 800 M to USD 1 M annually (TACAIDS and UNAIDS 2016), against estimated spending in 2016 of USD 538 M.

Since 2015: changing context

Uncertain financing. Although the HIV response has benefitted from increasing external contributions, since the publication of IC 1.0 in 2016, domestic contributions have not increased as much as expected. Moreover, key donors, including PEPFAR and Global Fund, have indicated that external resources may flatline or decrease in coming years, which could have serious consequences given that donors account for 90% of financing. Although resources have increased, total external and domestic financing have not significantly exceeded USD 600 M annually, whereas the IC 1.0 called for levels to reach twice as much. Donor funds may decline further given their concerns about inefficiency in Tanzania's HIV program: even with additional resources in recent years, programmatic gains have been less than expected as the number of new PLHIV initiated on ART has remained relatively constant (PEPFAR 2019a).

Figure 1-1. HIV expenditure 2015-2017 and 2018-2020 available funding
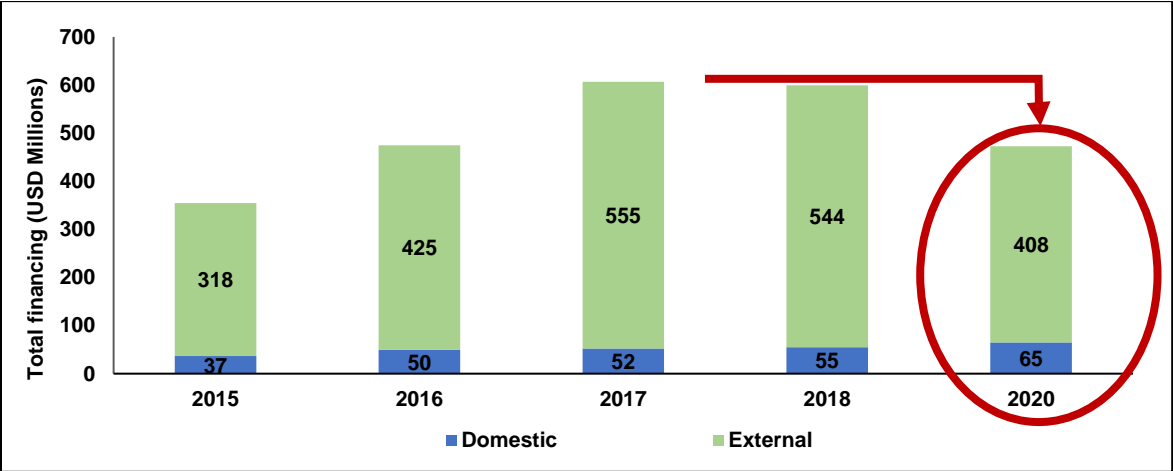
Key program challenges. Despite the substantial achievements in ART scale-up and prevention efforts to date and strong national leadership, Tanzania is currently still not on track to meeting 2030 global goals for testing, treatment, prevention, or stigma reduction. Closing the testing gap poses one of the greatest challenges and is a bottleneck to meeting the others as well. Currently, only 61% of people living with HIV are aware of their status, significantly short of the 2020 goal of 90% and the 2025 goal of 95%. Among the PLHIV who are aware of the status, 94% are on ART and 87% of them are virally suppressed. But because of low testing coverage, only 57% of all PLHIV (including those aware and unaware of their status) are on ART and only 50% of all PLHIV are virally suppressed (UNAIDS 2018; TACAIDS and ZAC 2018). Increasing the number of PLHIV diagnosed will also require significant increases in PLHIV on ART to sustain progress towards 95-95-95. As coverage on the first 90 increases, the number of PLHIV on ART and who are virally suppressed will have to keep pace to stay at high levels. Assuming the current size of the adult PLHIV 15 years and older (based on 2017 values), an increase of 37% and 44% respectively would be required, see *Figure 1-1* below. Given population growth, the absolute number of people on ART associated with 95%-95%-95% will increase over time.

Figure 1-2. Progress towards 95-95-95
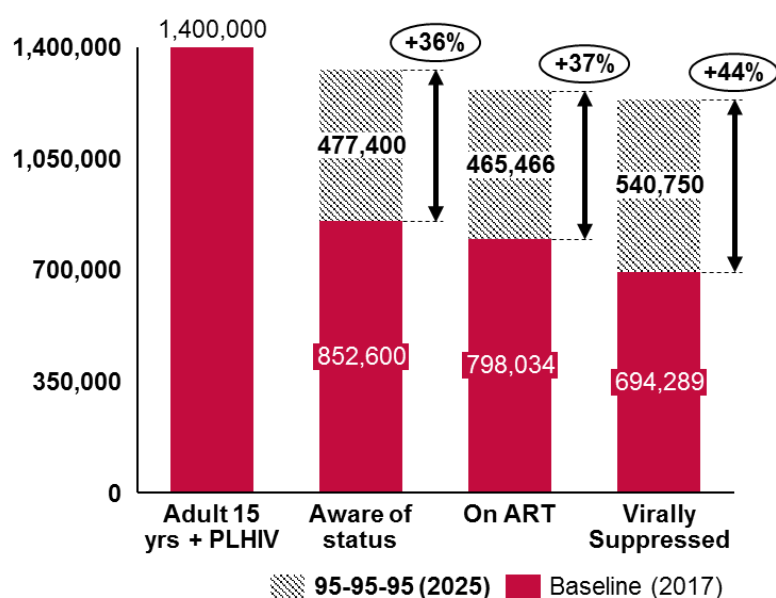
Source: UNAIDS (2018). Aidsinfo data; TACAIDS and UNAIDS (2016). Tanzania HIV Investment Case Reference Report; ICAP et al (2017). Tanzania Population-based HIV Impact Assessment 2016-2017 Summary Sheet: Preliminary findings.

Objectives of Investment Case 2.0

The objective of Investment case 2.0 is to put forward a framework for supporting the acceleration of the HIV response with a focus on program financial sustainability and implementation efficiency, given funding uncertainty and program challenges. The Investment Case 2.0 aims to build on the IC 1.0 by taking into account already realized efforts to achieve allocative efficiency but accounting for the latest epidemiological, programmatic, and financing context.

This report is divided as follows:

- Chapter 1 sets the scene for the IC, providing definitions and context
- Chapter 2 summarizes the epidemiological and programmatic background
- Chapter 3 provides a framework for the IC, including methods and data and a definition of the key scenarios being explored
- Chapter 4 models the Constant Coverage and National Strategy Scenarios
- Chapter 5 looks at whether national goals could be achieved at lower cost through optimization
- Chapter 6 examines optimizing impact under tight funding in the event of declining donor financing
- Chapter 7 analyzes options for mobilizing increased domestic financial resources to fill the gap in declining donor funding
- Chapter 8 explores the costs and impacts of targeting key gaps in the national response
- Chapter 9 presents the main takeaways for the national response under the Investment Case

Key Questions of Tanzania's Investment Case 2.0

Key questions that the investment case seeks to answer include:

- What **amount of resources** will be required to achieve and sustain goals of HIV response articulated in the **National Strategy**?
- What impact will the National Strategy have on the future of the HIV response?
- What is **the gap** between the available resource envelope and expected resource needs to achieve the national strategy?
- Can available resources be **optimized** through achieving greater allocative and technical efficiency to better maximize the impact of available resources?
- What if there is even **less funds** than what is currently available- due to donor funding declines— what impact would this have on the future of the response?
- Could **new, additional commitments of domestic resources** fill the gap of declining donor funds? Where can these resources come from?

Relationship with other national documents

The Investment Case 2.0 not only draws on the analysis in the first Investment Case but also is the key document connecting the other key national strategic documents, updates to national guidelines, latest epidemiological information, the 2018 PEPFAR country operational plan and Global Fund funding request 2018-2020, and targeted cost and efficiency studies. Key strategic documents include the National AIDS Control Program's (NACP) Health Sector HIV Strategic Plan IV and the Tanzania AIDS Commission's (TACAIDS) National Multisectoral Strategic Framework IV. Important updates to testing and treatment guidelines from the National Control Program have been accounted for here.

Health Sector HIV Strategic Plan 2017-2022. The HSHSP IV focuses on sustaining previous progress and addressing outstanding barriers to Fast-Track 2030 goals, including targeted prevention interventions, increasing ART coverage, and investing in health system strengthening. Specific strategy examples include:

Prevention

- Integration of HTC and STI screening
- Sustaining gains in condom distribution
- Behavior change campaigns aimed at men

Treatment

- Strengthening linkage to care
- Strengthening community-level follow-up and treatment support
- Enhancing early initiation to ART and adherence support
- Intensified action for EID
- Reduced barriers for key populations

Health systems strengthening

- Address weaknesses in health care delivery systems
- Mobilize resources to support universal access
- Provide community-based care and support
- M&E to ensure evidence-informed decision-making

National Multisectoral Strategic Framework 2017/18-2022/23. The National Multisectoral Strategic Framework 2017/18-2022/23 (NMSF IV) adopted the investment case approach as advised by the Investment Case 1.0 and thus aimed to support acceleration of high impact interventions for prevention and reducing deaths, to improve efficiency and effectiveness of the national program.

The NMSF IV aims to achieve the following results to reach Fast Track and 95-95-95 targets. Key strategies for epidemic control in the NMSF are divided into behavioral, biomedical, and structural interventions.

Behavioral interventions	• Scaling up programs addressing risk perception and risk reduction • Community mobilization campaigns • Empowerment workshops • Increasing empowerment of PLHIV clusters and networks
Biomedical interventions	• Scale-up differentiated HTS models • Enhance retention • Mobilize and create demand for VMMC • Scale-up condom programs • Increase integration of HIV services • Scale-up PrEP to priority populations
Structural interventions	• Enhance political will and resources to support stigma reduction Increase advocacy to address gender inequalities • Increase capacity for protection and treatment of GBV • Address legal and policy barriers • Strengthen legal and psychosocial support systems

Other documents. Since PEPFAR's 2019 Country Operational Plan (COP) was not completed by the time of writing the Investment Case 2.0, the analysis relies on the 2018 COP and the 2019 PEPFAR Planning Letter when relevant. The Global Fund Funding Request for 2017-2020 was also a key input. The Investment Case analysis uses the latest epidemiology data from the Spectrum estimates 2019 and the Population HIV Impact Assessment (PHIA) 2016-2017 results. Key studies from Health Policy Plus were also used as inputs to the analysis, especially around the technical efficiencies.

Investment Case 2.0 development process

This updated investment case, like the first version, remains a country-led process. TACAIDS and NACP chaired the Investment Case 2.0 Steering Committee, formally requesting the undertaking and directing the process. The investment case development was divided into 3 phases: 1) The Project Kick-off phase: November 2018, 2) The Modeling phase: December-May 2019, and 3) The Finalization phase: May-July 2019. The goals of each phase are described below.

1. Project Kick-off
   • Consult all major stakeholders
   • Determine best arrangements for country sponsorship and technical input into the IC 2.0
   • Ascertain which key questions IC 2.0 should aim to answer
   • Probe and test with stakeholders early scenarios
   • Collect information and data on recent policy and program changes in the national HIV response, epidemiological, and financial parameters

2. Modeling
   • Design scenarios, including technical efficiency assumptions
   • Conduct scenario workshop with stakeholders
   • Iterate scenarios
   • Calibrate Goals cost projections with Tanzania's cost data
   • Use Goals model to estimate disease impact and costs of scenarios

- Analyze financing implications of scenarios

3. Finalization
   - Draft final products, including written brief and presentation
   - Present final IC to stakeholders

In the first phase of the Investment Case 2.0, 20 stakeholders were consulted to inform the guiding questions for the investment case to address and frame the most relevant policy issues at hand. The full list of stakeholders is in Annex 1. Preliminary scenarios and analyses were presented by the technical team to the Steering Committee and Technical Working Group in February 2019. The agenda of the Technical Working Group Meeting is in Annex 2.

Designed uses of Investment Case 2.0

The Investment Case 2.0's main goal is to set a common vision to align stakeholders on the national HIV program's priorities and greatest risks. The Investment Case 2.0 will inform future iterations of the national and thematic HIV strategies. It is meant to help shape and reinforce Tanzania government policies on a range of HIV matters including coverage targets, allocation of resources, adoption of optimal approaches to key interventions such as ART, testing, key population preventing, and AGYW, and mobilization of domestic budgets and other funding. It will also be used to inform the next Global Fund Funding Request and could be a useful input to the upcoming PEPFAR SID exercise and analysis of ways to sustain program areas backed by PEPFAR such as human resources.

The analyses and conclusions are not meant to be prescriptive. Since the Investment Case 2.0 is a collaborative exercise with major national ownership, the IC results will be used as part of a policy dialogue during the second half of 2019 involving the government, civil society, and the key international partners, leading to decisions on HIV program scope and financing for the next 3-5 years.

CHAPTER 2: STATE OF THE HIV EPIDEMIC AND NATIONAL RESPONSE

State of the HIV epidemic

The investment case is only useful if it is rooted in the local epidemiological context and focuses on maximizing impact for the most affected populations. The following section gives an overview of the current epidemiological trends and highlights where intervention efforts should be focused.

Overview of epidemiological profile

As a result of expanding treatment coverage and concerted prevention efforts, HIV prevalence in Tanzania is stabilizing and new infections and deaths continue to decline. In 2012, the national prevalence of HIV was 5.4% (TACAIDS 2013), but by 2016 the national prevalence had dropped to 5.0% for adults 15-64 years (TACAIDS and ZAC 2018). This corresponds to 1.5 million people living with HIV (PLHIV) (UNAIDS 2018). Deaths have decreased by 33% from 2010 to 2016, from 50,700 per year to 33,800 (TACAIDS 2018). Incidence has also declined from 7.7 per 1,000 adults in 1993 to 2.7 per 1,000 adults in 2017 (TACAIDS and ZAC 2018).

Key HIV facts in Tanzania:

- National prevalence is **5.0%** with **1.4 million** people living with HIV ages 15-64
- In 2016, there were **65,000 new infections** annually and **33,800 AIDS deaths**
- Annual deaths have decreased by over **50%** since 2010 as ART has expanded
- The rate of new infections is decreasing steadily,

Figure 2-1. HIV-related deaths and new HIV infections 1990-2017
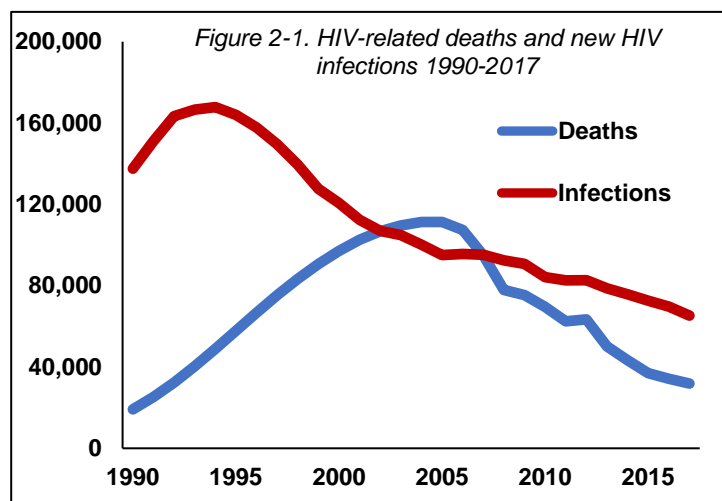
Despite these positive trends, new infections have not decreased as quickly as deaths (*Figure 2-1; Source: UNAIDS 2018).* Fewer annual deaths reflect a strong treatment program. But to reach epidemic control, the number of new infections will ultimately have to drop below the number of annual deaths (UNICEF and MoHCDGEC 2018). Currently, about 65,000 new infections occur annually compared to only 33,800 deaths annually (TACAIDS 2018; UNAIDS 2018). Incidence of HIV is currently highest among adolescents 15-19 years, especially among adolescent females. Overall, over 30% of new infections are transmitted among stable heterosexual relationships, overwhelmingly to the female partner, while about 17% are among males with multiple partners and 21% among males with male partners. About 17% of new infections are among sex worker clients and 2% among men who have sex with men (TACAIDS and UNAIDS 2016).

Variations in HIV burden across age, gender, and regions are important drivers of the local epidemic and are described further below. These epidemic characteristics should guide strategic priorities of the national response and shape the choices in the IC 2.0.

Age trends

Adults ages 40-49 years bear the greatest burden of HIV in terms of prevalence, as they were infected at the start of the epidemic when incidence was high and knowledge of effective prevention interventions was still limited *(Figure 2-2)* (TACAIDS and ZAC 2018). The highest incidence is among adults ages 25-34 years at 0.34% (*Figure 2-3*).

Of particular concern is a recent spark in new infections among adolescent girls 15-19 years and young adults 20-24 years (UNCIEF 2018). Since 2010, despite positive overall trends among new infections, there was a 9% increase in infections among adolescents 15-19 years and an alarming 56% increase among young adults 20-24 years in Tanazania (UNICEF 2018).

HIV infection in children also remains a significant concern. There are 125,000 children under age 15 years living with HIV country-wide, corresponding to a 0.4% prevalence nationally (UNCIEF 2018). Viral load suppression is particularly low among children at 18.4% of children living with HIV (UNICEF and MoHCDGEC 2018). See Annex 3 for complete breakdown of prevalence by age group.

Figure 2-2. Prevalence of HIV across age groups by gender

Source: Tanzania Commission for AIDS (TACAIDS), Zanzibar AIDS Commission (ZAC) (2018). Tanzania HIV Impact Survey (THIS) 2016-2017: Final Report. Dar es Salaam, Tanzania.

Figure 2-3. Incidence of HIV across age groups by gender

Source: Tanzania Commission for AIDS (TACAIDS), Zanzibar AIDS Commission (ZAC) (2018). Tanzania HIV Impact Survey (THIS) 2016-2017: Final Report. Dar es Salaam, Tanzania.

Gender disparities

The HIV epidemic continues to disproportionately affect females. While the overall prevalence among adults 15-64 years is 5.0%, the prevalence among female adults is 6.5% compared to 3.5% among male adults (TACAIDS and ZAC 2018). Females have a higher burden of HIV across all age groups, and about twice in age groups 15-39 years (TACAIDS and ZAC 2018), as shown in *Figure 2-2*). See Annex 3 for the full breakdown of prevalence by age and sex. Females also have a higher incidence of new infections in every age group, except 35-49 years (*Figure 2-3*). The incidence among females 25-34 years is the highest of any age-gender group at 0.7%, over 4-times greater than the incidence among males in this age group (*Figure 2-3*).
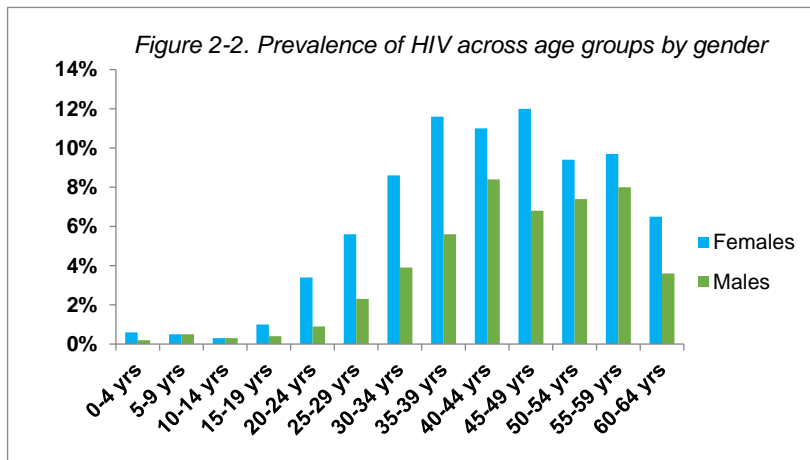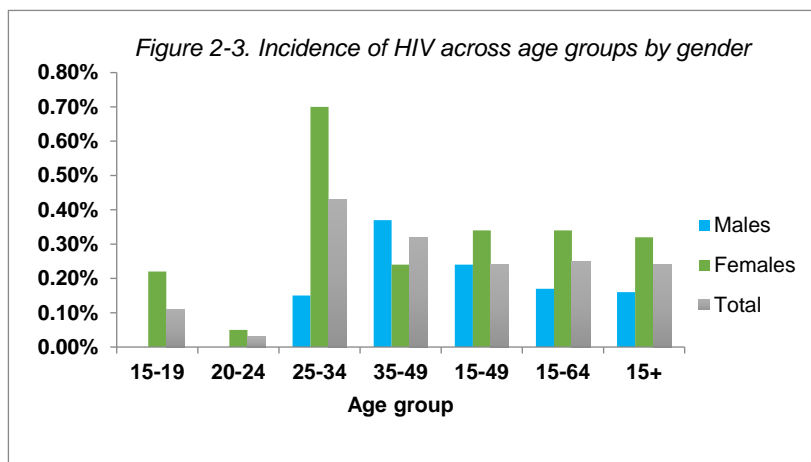
Regional variation

Significant differences in HIV prevalence also exist across regions. Overall, HIV prevalence is higher in urban areas than rural areas at 7.5% compared to 4.5% (TACAIDS 2018). The highest regional prevalence among adults 15 years and older is in Njombe at 11.4%, while the lowest regional prevalence is less than 1%, as seen in seen in Zanzibar and Lindi (TACAIDS and ZAC 2018). About half of the country's infections are concentrated in seven regions, predominantly in the South-West highlands and West-Central regions. *See Figure 2-4.* For example, Dar es Salaam accounts for 14% of all infections, due to high population density, and Mbeya accounts for 11% alone, driven by a combination of population density and a very high prevalence of 9.3% (TACAIDS and UNAIDS 2016). Kagera, Tabora, Mwanza, Shinyanga, and Njombe each account for about 5% of infections individually or 25% cumulatively. Higher prevalence seen in the Southern Highlands may be due to high levels of migration and major transportation corridors cutting through the regions.

Key populations

Key populations including female sex workers (FSW), men who have sex with men (MSM) and people who inject drugs (PWID) continue to face discrimination and stigma in accessing prevention and treatment services, which puts them at higher risk of infection and poorer disease outcomes (NACP 2014). In 2014, it was estimated that there were 155,450 FSW, 49,700 MSM, and 30,000 PWID in Tanzania (TACAIDS and UNAIDS 2016). The HIV prevalence among FSW is estimated at 26%, for MSM at 25% and for PWID at 36% (TACAIDS 2018). Injection drug use is on the rise in urban centers, suggesting even more individuals could be at risk of infections (PEPFAR 2018a). HIV prevalence among transgender populations in Tanzania is unknown. About 69% of FSW have accessed a combined package of prevention services, compared to 28% of MSM (CCM 2017). There are only 3 opioid substitution therapy clinics in Tanzania, and only 20% of PWID have access to prevention and OST services (CCM 2017).

Summary of key epidemiological trends

In summary, the following epidemiological trends should guide strategic decision-making for setting priorities of the future of the national response. In particular, prioritization exercises should seek to target the groups most affected, especially in resource-constrained circumstances where only limited funds are available to underpin efforts to reach national targets.

- Despite both incidence and mortality declining over time, annual new infections have not fallen as quickly as HIV-related deaths in recent years.
- New infections among adolescents and young adults are increasing
- Females continue to face a greater burden of HIV than males, with both a higher prevalence and incidence of new infections
- Regional variations in HIV burden persist, with the highest prevalence seen in the South-West highlands and West-Central regions

National HIV Program Response in Tanzania

To achieve national goals for epidemic control, strong and effective prevention and treatment programs are required. NACP and TACAIDS continue to demonstrate leadership in guiding the scale-up and the strategic vision of these critical programs for the response. The national program has made significant progress historically and in the last five years, but this progress is currently not sufficient to meet national

goals. New infections overall are not declining quickly enough, and new infections among adolescents and young adults are increasing.

National HIV program

In the Investment Case 1.0, eight key program areas were extensively reviewed, including: HIV testing & counseling, treatment, VMMC, PMTCT, behavior change and condom promotion, young women & girls, key populations, and new innovations. *Figure 2-4* describes these program areas.

Figure 2-4   Packages of interventions for key program areas

Program area	Package of interventions
HIV testing and counseling (HTC)	
	HTC implemented through multiple modalities: • Client initiated VCT • Provider-initiated testing and counseling (PITC) • TB and other clinical services • Home-based counseling and testing • Index-testing
Prevention	
Condom promotion	TACAIDS and partners launched a new public-private "total market approach" to condom programming in 2016, including a public-sector branded condom program, which aimed to increase condom access but total market approach is not yet fully implemented
VMMC	VMMC program focuses on: • Sexually active men in high HIV prevalence regions • Low circumcision coverage regions for short-term impact, with targeting of younger males for long-term impact
PMTCT	• National PMTCT strategy calls for provision of ARV combination therapy to all HIV-positive women, in accordance with Option B+ guidelines, integrated with routine reproductive and child health services. • Main interventions include HTC, provision of ARVs, modified obstetric care, and counseling for safer infant-feeding options
Behavior change and condom promotion	• BCC efforts have included mass media that promoted individual knowledge and rights-based sex education in schools, condom promotion, shifts in social norms regarding HIV prevention, and the demand generation for HIV services • "Fatiki" campaign on cross-generational sex from 2008-2011 • Mass media for condom promotion for Salama brand; • Youth-focused BCC and condom promotion integrated into existing peer networks and sports
Adolescent girls and young women (AGYW)	AGYW programs have focused on comprehensive approaches to addressing the vulnerability to AGYW to HIV. Up to 2016, the main programs included: • Cash transfers: In the program TASAF-III, extremely poor households received a fixed monthly cash transfer to increase household consumption, and a variable conditional cash transfer for households with pregnant women or children of primary/secondary school age. • School-based education In 2016, PEPFAR launched DREAMS, an initiative to scale-up a comprehensive bundled package of structural, behavioral, and biomedical interventions targeted to AGYW.
Key populations	• FSW interventions have focused on individual BCC, including condom promotion through social marketing programs • MSM services limited to 1-2 community-based programs • Limited harm reduction services • Limited efforts at addressing enabling environment for stigma & discrimination
Treatment, care, and support	
ART	• Implemented with facility-based ART delivery with CHW support in retention with physician-initiated ART only. Community- and home-based support services provided. • Drug inputs: First line treatment is TDF/3TC/EFC • Treatment eligibility criteria: <350 uL CD4 count, TB/HIV co-infection, all children under-5 • Differentiated service delivery models for stable patients
Critical enablers	
Cross-cutting	• Criminalization of FSW, MSM, and PWID persists. Limited progress has been made in implementing the WHO and Tanzanian key-population guidelines that support community-based combination prevention packages for these groups.

	• Education programs to reduce partner violence and stigma are in place but these issues are still widespread and continue to inhibit testing and linkage to care among women • Cash transfer programs improve the enabling environment through improved household economic status, increased secondary school attendance, improved mental and physical health, delays in sexual debut and pregnancy, and reduced sexual risk behaviors.

Source: TACAIDS and UNAIDS (2016). Tanzania HIV Investment Case Reference Report.

Since the IC 1.0, additional progress on scaling select prevention interventions has been strong, such as male circumcision for adolescent boys and young men and PMTCT. The percentage of pregnant women aware of their status on ART has increased from 71% to 98%. VMMC among adolescent and young men has increased from 70 to 78% (*Figure 2-5*).

Figure 2-5. Progress since 2016 and remaining gaps for VMMC and PMTCT
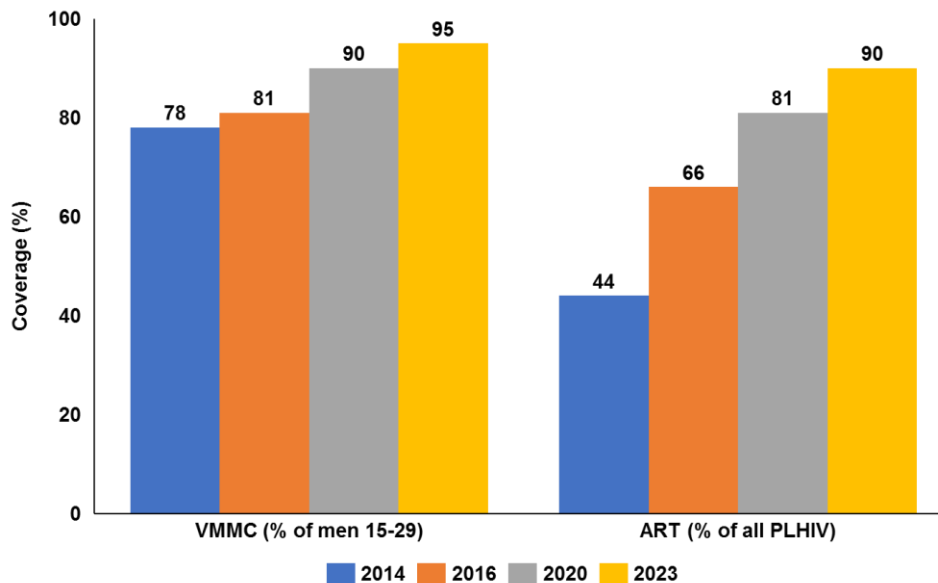
Source: UNAIDS (2018). Aidsinfo data; TACAIDS and UNAIDS (2016). Tanzania HIV Investment Case Reference Report; ICAP et al (2017). Tanzania Population-based HIV Impact Assessment 2016-2017 Summary Sheet: Preliminary findings; TACAIDS (2018). NMSF IV.

Progress on condom promotion and PrEP has not been expanded significantly. Coverage of cash transfers is not well known. *Figure 3A-5* in the annex compares coverage levels for key interventions from the IC 1.0 with those in 2018.

Progress towards 90-90-90 and 95-95-95 – the current treatment cascade

Progress is promising but *Figure 2-6* also shows how large the remaining ART coverage gaps are for 90-90-90 and 95-95-95 targets.

The latest Tanzania HIV Impact Survey in 2016-2017 found that 61% of PLHIV reported that they are aware of their HIV status, of which 94% had started ART and 87% were virally suppressed (TACAIDS and ZAC 2018). With only three-fifths of PLHIV aware of their status, there is a major need to improve testing strategies (UNICEF and MoHCDGEC 2018). Program data suggest that HIV testing yields have been falling, pointing to a need for more evidence-based targeting of outreach towards populations with limited access to testing services including adult men, adolescents, and key populations (PEPFAR 2018a).

From 2013 to 2016, the number of PLHIV on ART doubled from 432,000 to 847,000 (NACP 2017). But due to poor testing coverage and a low first 90, this suggests that only 57% of all PLHIV (both aware and unaware of their status) are on ART. For males this figure is worse, at only 47% of all males living with HIV on ART. About 62% of women living with HIV are on ART (*Figure 2-7*). Relatedly, among all PLHIV, viral load suppression has been achieved in only 50% of all PLHIV, despite high rates of suppression among those currently on ART (87%) (PEPFAR 2018a). Viral load suppression is especially low in children with HIV (UNICEF and MoHCDGEC 2018). Loss to follow among PLHIV could also be improved with a 12-month retention rate for ART patients only at 74% (PEPFAR 2018a). As screening expands, treatment, retention, and viral load suppression coverage of those diagnosed must keep pace to sustain current progress. To ultimately reach 95-95-95 targets, over 450,000 more individuals will have to be put on ART.

Figure 2-6. Progress on ART coverage since 2016 and remaining gaps for 90-90-90 and 95-95-95 for Total 15+, Males 15+, and Females 15+
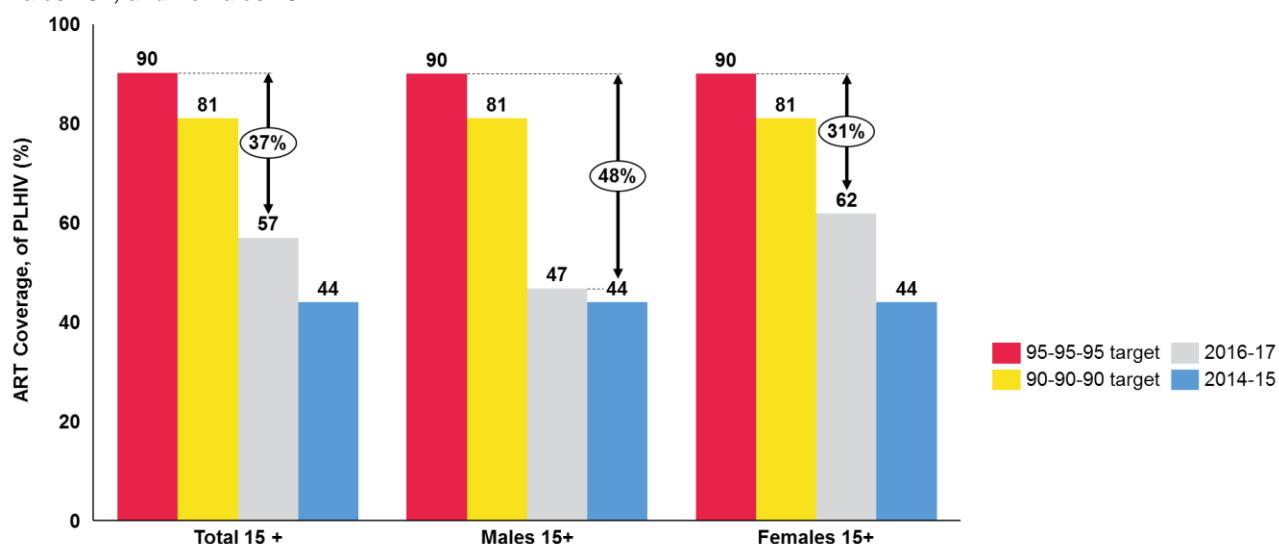
Source: Tanzania HIV Investment Case 2016 (1.0); Tanzania HIV Impact Survey 2016-2017 Final Report.

Overcoming key program gaps and challenges 2020-2030

In addition to addressing high HIV incidence among AGYW and strengthening prevention efforts, testing and treatment coverage are also major challenges for the program. The IC 1.0 identified specific bottlenecks and possible innovations to help overcome these program gaps.

The most progress has been made on integrated programs for AGYW. Since 2015 PEPFAR has intensified efforts to reduce new infections in AGYW and young females ages 15-24 years through the DREAMS initiative. DREAMS comprises a comprehensive set of biomedical, behavioral, and structural interventions such as targeted HIV testing, HIV/violence prevention, sexual and reproductive health education and services, business and financial literacy, and young parenting skill building. By end of 2018, PEPFAR aimed to reach 176,310 adolescent girls and young women in nine sub-national units (SNUs) (PEPFAR 2018a).[1] Some districts showed a decline of greater than 25% in the 2018 evaluation (PEPFAR 2018b).

Some progress on HIV testing and counseling has been made. NACP has released a new HTC strategy for diversified and targeted approaches to testing and counseling. Coverage for HIV testing and counseling (HTC) has increased to over 9 million Tanzanians annually by 2016 (TACAIDS 2018;

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[1] There are about 9 M AGYW in Tanzania.

PEPFAR 2018a), but with only 52% of PLHIV self-reporting that they know their status, other targeted approaches are needed (TACAIDS 2018). NACP's testing strategy focuses on scaling up services such as index-based testing, community-based approaches, HTC among key populations, and HTC integration into other health services (i.e. STI, TB, etc). PEPFAR has intensified HTC efforts and is pursuing more efficient strategies. More limited progress has been made on ART bottlenecks. Community-based adherence has been explored by government; a study on cost and efficiency has been commissioned but no initiatives have been scaled.

Figure 2-7 Innovations considered in IC 1.0 and progress to date

	Bottlenecks	Innovations considered	Progress in implementation to date Green= Progress achieved Yellow= Some progress achieved Red= No or limited progress achieved
Testing and counseling			
HIV testing and counseling (HTC)	• Regional variation in testing uptake • Linkage to care • Low coverage for key populations	• Scale-up of index testing or partner notification	• Index testing is featured in NACP's 2019 HTC Strategy and is a PEPFAR priority. But Testing coverage remains low
		• Community-testing (vs facility-based testing)	• Community-based testing strategies prioritized in NACP HTC Strategy. But testing coverage remains low.
		• Workplace HTC	• Workplace HTC included in NACP HTC Strategy
Prevention			
Adolescent girls and young women (AGYW)	• High incidence	• Prioritize women ages 15-24 years old engaged in cross-generational or transactional sex	• DREAMS program implemented and expanded.
		• Scale-up cash transfers for young women	• DREAMS program implemented and expanded. Global Fund working with UNCIEF and government on cash transfer pilot.
Treatment, care, and support			
Treatment, care, and support	• Pediatric coverage only 30.1% (2014) of eligible children • Retention and adherence among children and mobile populations • Increasing treatment failure and unmet need for second line drugs/ VL testing	• Home-based ART	• No progress due to legal barriers
		• Community ART delivery	• No progress due to legal barriers
		• Community adherence groups	• Limited progress; NACP conducted costing and efficiency study
		• mHealth adherence groups	• Limited progress due to not being a national priority
		• CHW adherence groups	• Limited progress; NACP conducted costing and efficiency study

Key:

Green	Progress achieved
Yellow	Limited progress achieved
Red	No progress achieved

In addition to those innovations considered in the first IC, other new developments have occurred in the last 3-4 years, as described below. A summary of these developments is shown in the timeline in *Figure 2-8.*

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<u>HIV testing and counseling</u>

Self-testing is being explored. The government is working on addressing the legal barriers in HIV care provision laws to self-testing (PEPFAR 2018a).

<u>Prevention</u>

- *PrEP has been piloted.* In March 2018, PrEP for key populations and discordant couples was rolled out, beginning in select sites in 14 regions (PEPFAR 2018a). Targets for PrEP are 30% for key populations by 2020 and 75% coverage for key populations by 2023 (TACAIDS 2018).
- *Geographic prioritization has been emphasized on the testing and prevention front.* Targeting of high-burden areas, including Attained councils that have reached 90% coverage and Scale-up councils at less than 90% coverage has been of particular focus of PEPFAR.

<u>Treatment, care, and support</u>

- *ART test and start policy has been implemented with the removal of eligibility criteria.* Since the HIV program adopted WHO recommended "treat all" approach, the number of ART clients has increased from 474,435 in 2014 (less than one-third of all PLHIV) to 913,422 by end of 2017, now about 50% of PLHIV (TACAIDS and UNAIDS 2018; TACAIDS 2018; PEPFAR 2018a).
- *Transitioning first-line ARV regimen to Dolutegravir-* WHO released interim guidelines in July 2018 that conditionally recommended Dolutegravir (DTG) as the preferred first line ARV for newly initiated patients (WHO 2018). These interim guidelines indicated with moderate certainty that DTG would also be the preferred first-line ARV for adults and adolescents. The interim guidelines suggested low quality evidence for the safety and efficacy of DTG among pregnant women and children.
- *Nurse-initiated Management of Antiretroviral Therapy (NIMART) was rolled out in 2018,* following MoHCDGEC approval of the NIMART handbook in March 2017 (PEPFAR 2018a).
- *Differentiated care models have been partially implemented, with two- or three-month prescriptions for stable ART patients.* Previously, stable patients were recommended to attend clinic visits monthly. Scale-up of multi-month scripting with two-three-month ART prescriptions has been successfully introduced for stable patients (PEPFAR 2018a). The full differentiated care models recommend 6-month prescriptions and simplified lab algorithms, which have not been fully realized in Tanzania. This should lead to greater ease of access to ARVs for patients, higher retention, and cost savings on staff and patient time. Details on the DSDM guidelines are shown in Annex 8.
- *Community-based support services.* In an effort to increase retention of care and to relieve stress on health clinics there is an interest to transition ART support services (adherence support, treatment literacy, well-being checks, follow-up for defaulting patients) from the facility-level or mix of facility-community level to full community level

Figure 2-8: Recently implemented program developments
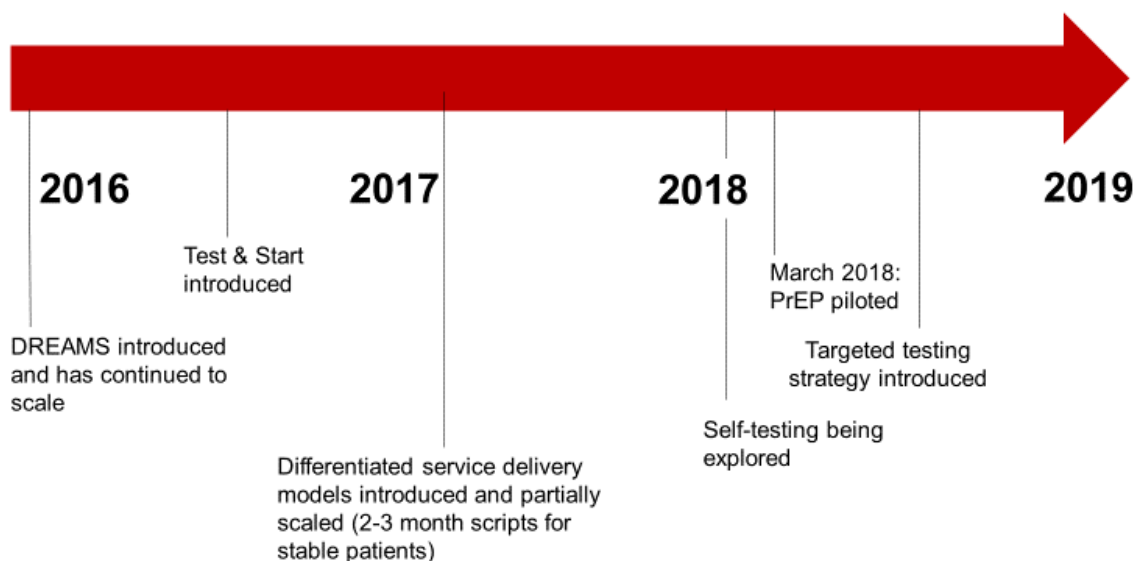
Summary of national HIV program review

In summary, since the first IC in 2016, significant incremental progress has been made toward national strategic targets for HIV treatment leading to meaningful reductions in AIDS deaths and new infections. But, further expansion of service delivery in pursuit of 95-95-95 targets requires:

- **Efficiently finding PLHIV** who are not aware of their status and linking them to treatment. Almost 40% of PLHIV do not know they are positive.
- **Accommodating large increases in PLART**. Coverage among those aware of their status is high (94%) but accelerated case-finding will greatly increase the number of PLHIV receiving ART.
- While accommodating significant increases in the number of patients, ART programs will simultaneously need to improve retention in care or other aspects of case management in order to **increase viral suppression** among PLART from 87% to 95%.

In addition, strategic targets for HIV incidence reduction are not likely to be met with a singular focus on 95-95-95 treatment targets. Additional prevention strategies will need to be prioritized.

Given the likely financial challenges the Tanzania's HIV program faces, these activities will have to be undertaken with a key focus on efficiency. Since the first investment case, progress toward improved allocative and technical efficiency in both treatment and prevention efforts has been slow, despite the imperative to accelerate program implementation with limited budgets.

This key challenge will guide how the approaches within the IC 2.0 framework -- prioritization, domestic resource mobilization, and technical efficiencies-- will be used to close the resource and program coverage gaps. **Prioritization** can help make the limited available funds go further by focusing efforts on populations with the highest burden and programs with the greatest gaps, where cost-effectiveness is the highest. Through **domestic resource mobilization** new funding sources can be tapped to expand the impact of these high priority interventions. Then, technical efficiencies can free up additional funds by reducing costs of major interventions and thereby channels savings into areas where additional progress can be achieved to overcome current program challenges and roadblocks and increase coverage.

HIV Financing in Tanzania

Historical trends

The success of the HIV program to increase case finding and numbers on ART to date has been enabled by increasing financial resources over time. Total HIV expenditure grew from USD 466.8 M in 2015 to USD 612.0 M in 2017, the most recent year for which all data is available. PEPFAR and the Global Fund accounted for about 90% of financing from 2015-2017. Several other donors and partners beyond PEPFAR and the Global Fund have provided small amounts of financial support and technical assistance.

Figure 2-9. Domestic and external HIV expenditure 2015-2017
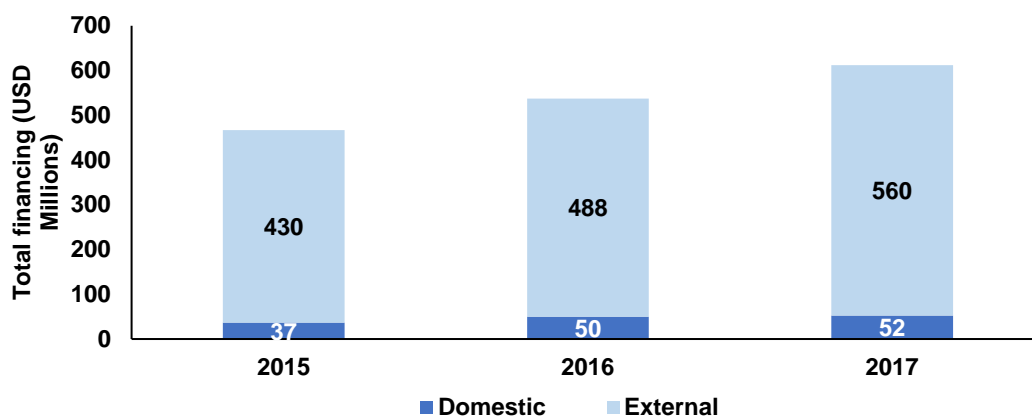
Sources: Domestic: Global Fund (2018). National Funding Landscape Analysis. PEPFAR: PEPFAR (2018). PEPFAR Expenditure Report 2017; Global Fund: Global Fund (2018). Global Fund Expenditure Report 2017. Tanzania HIV Expenditure; Other external funders: Global Fund (2018). National Funding Landscape Analysis.

Of external partners, PEPFAR contributed USD 290.4 M in 2015, which increased by 17% in 2016 and 11% in 2017. PEPFAR accounted for 61-63% of expenditure in 2015-2017. The Global Fund contributed USD 133.9 M in 2015 and USD 143.0 M in 2016, respectively 29% and 27% of total expenditure. In 2017, Global Fund expenditure increased to USD 178.1 M, still representing about 29% of total expenditure given parallel increases in domestic and PEPFAR funding. Overall, donor expenditure from 2015-2017 reflected an optimistic environment which has changed dramatically over the past two years (see below).

Figure 2-10. Sources of HIV expenditure 2015-2017

	Domestic		PEPFAR		Global Fund		Other external partners		Total Funding
	Amount (USD M)	% of Total	Amount (USD M)	% of Total	Amount (USD M)	% of Total	Amount (USD M)	% of Total	Amount (USD M)
2015	36.8	8%	290.4	62%	133.9	29%	5.8	1%	466.8
2016	49.8	9%	339.3	63%	143.0	27%	5.3	1%	537.3
2017	52.3	9%	376.2	61%	178.1	29%	5.4	1%	612.0

Note: PEPFAR expenditure figures exclude the Operations and Management value as provided for in COP estimates. These amounts range from USD 11 M (2015) to USD 16 M (2016). Sources: Domestic: Global Fund (2018). National Funding Landscape Analysis. PEPFAR: PEPFAR (2018). PEPFAR Expenditure Report 2017; Global Fund: Global Fund (2018). Global Fund Expenditure Report 2017. Tanzania HIV Expenditure; Other external funders: Global Fund (2018). National Funding Landscape Analysis

Funding by program component

Treatment, care, and support in 2017 accounted for about 50% of the total program costs. HIV testing and counseling represented 4% of costs. SBCC was the largest prevention intervention absorbing 6% of

costs while VMMC absorbed 5% and condoms less than 1%. The category of SBCC and prevention for the general population may include some HIV testing and counseling activities based on the classifications used in the expenditure reports referenced . Program management and activities supporting the enabling environment and health systems strengthening accounted for more than a quarter of total expenditure in this year.

Figure 2-11. Funding by HIV program component, total expenditure 2017

Interventions	Total USD	% of Funding
Treatment, care, and support	307,468,825	50%
HIV / TB	725,361	<1%
HIV testing and counseling	21,645,287	4%
AGYW	20,147,845	3%
Key populations	3,911,435	1%
SBCC / prevention for general population	35,834,420	6%
Condoms	349,963	<1%
VMMC	30,912,453	5%
PMTCT	3,163,329	<1%
PrEP	-	0%
Enabling environment/HSS (strategic info.)	26,364,047	4%
Enabling environment/HSS	46,236,892	8%
Program management	109,848,997	18%
OVC and not specified	5,382,398	1%
Total Expenditure	611,991,252	100%

Global Fund

Contributions by the Global Fund have been focused on specific interventions. The largest contribution has been for the 'Treatment, care and support' of HIV positive people. Expenditures in this area increased from USD 119.8 M in 2016 to USD 142.0 M in 2017 and amounted to about 80% of total Global Fund expenditure in both years. The 'Other prevention' category includes HIV testing and counselling and accounted for 6.1% of expenditure in 2016 and 15.0% in 2017. Spending on key population interventions reached almost 7% of total funding in 2016 but then declined to 0.5% in 2017. Other investments are by comparison relatively small, notwithstanding their strategic importance.

Figure 2-12. The Global Fund high-level analysis of expenditure by intervention category (USD M)

HIV Intervention	2016[2]	2017	2016 % distribution	2017 % distribution
Treatment, care and support	119.8	142.0	83.8%	79.7%
Key populations	9.8	1.0	6.9%	0.5%
Other prevention	8.7	2.7	6.1%	15.0%
Systems strengthening	1.5	2.8	1.1%	1.6%
Other	3.1	5.6	2.1%	3.1%
Total expenditure	**143.0**	**178.1**	100.0%	100.0%

Source: Global Fund Expenditure Report 4E Tanzania HIV Expenditure

The current Global Fund grant (2018-2020) amounts to USD 367.6 M for HIV interventions and has been allocated almost evenly over the three years (2018-2020) which implies approximately USD 120 M per annum over the grant period (significantly lower than the USD 172.4 M contributed by the GF in 2017).

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[2] The significant difference between the 2015/16 expenditure and the January to December 2016 figure is due to significant expenditure in the second half of 2016 on treatment care and support included in the 2016 calendar year but excluded from the 2015/16 fiscal year.

Treatment, care and support remain the most important focus for funding in the current grant (USD 285 M, 78%). About USD 44 M is for prevention (general population, key populations, and adolescents and youth), about 12% of total funding. In addition to specific amounts for health management information and procurement systems, USD 41 M has been allocated to health systems strengthening.

PEPFAR

PEPFAR expenditure is disbursed over a wider group of interventions but the expenditure on treatment remains at approximately one half of all PEPFAR HIV spending. The procurement of ARVs comprised less than USD 2 million in 2015 but rose to USD 41 M in 2016. Other significant investments include HIV testing and counselling, providing support to orphans and vulnerable children, prevention through medical male circumcision and combination prevention for key and priority populations and the general population. Importantly, PEPFAR makes significant investments in health systems strengthening, more than USD 40 M in 2015 and 2016.

Figure 2-13. PEPFAR- High-level analysis of expenditure by intervention category (USD M)

HIV Intervention	2015	2016	2015 % distribution	2016 % distribution
Treatment, care and support	147.9	192.5	54.5%	50.9%
HIV testing and counselling	19.3	36.5	6.4%	6.6%
Orphans & vulnerable children	20.1	30.8	6.7%	6.9%
Prevention Key and priority populations	16.9	21.8	3.6%	5.8%
VMMC	31.0	23.2	7.4%	10.7%
Prevention - General population	8.1	-	5.6%	2.8%
Health systems	41.9	31.0	14.4%	14.4%
Other	5.22	3.49	1.4%	1.8%
Total expenditure	290.4	339.3	100.0%	100.0%

Note: Treatment, care and support includes prevention of mother to child transmission. A breakdown of 2017 expenditure was not available at the time of writing. **Sources:** PEPFAR Expenditure Report, 2017

Domestic financing

In 2017, the estimated domestic contribution was USD 52.3 M, less than 10% of total HIV expenditure. Domestic resources have increased over time, from USD 36.8 M in fiscal year 2014-2015 to USD 52.3 M in 2016-2017, a 42% rise over the three-year period. Looking further back, from July 2011 to June 2014 the 3-year total funding was USD 78.7 M, and this increased to USD 138.8 M from July 2014 to June 2017. It should be noted that these figures for government contributions include human resources, logistics support, and infrastructure, with relatively little spending on commodities, equipment, and technical assistance which is financed by the donors.

The estimates of the domestic contribution were derived from the Global Fund funding landscape analysis included in the funding request for the current grant. A breakdown of these amounts is not provided in the funding request but notes point to the National Health Accounts as the original source for the first-year o estimate (2015). For the years 2018-2020, approximately half the total domestic contribution is allocated to Program Administration and M&E, including significant allocations for human resources, logistical support and infrastructure. Thus, the increase in domestic contribution between 2015 and 2017 may have resulted, in part, from improved record keeping and reporting, salary increments and a change in the method for allocating shared costs to the HIV response. Significant increases were not reflected in the relatively low spending on commodities, equipment, and technical assistance, which remain heavily financed by donors. '

Future financing

Although HIV financing trends in Tanzania were upward during 2015-17, both PEPFAR and the Global Fund have signaled that the year on year increase in financing seen until 2017 will likely not continue. PEPFAR has indicated in the COP Planning Letter 2019 that the next funding cycle will see a 23% decline in allocated funding due to unsatisfactory country program performance. For the next Global Fund funding proposal to cover 2021-2023, the Global Fund has not offered specific guidance but key stakeholder interviews suggest that grant funding will not increase and Tanzania should be prepared for a decline in the next grant. Anticipated possible decreases in external funding are described in more detail in Chapter 6.

> **Donor funding declines are on the horizon:**
>
> **A 23% decline in PEPFAR funding is expected in FY 2020**

Key takeaways on HIV financing

In summary, although Tanzania has benefitted from increasing HIV expenditure over the past decade, the current financing landscape is less promising and the country will need to address several challenges moving forward:

- The HIV response has had a high dependence on external funding, but this external financing is likely to either stabilize or decline over the next few years.
- Domestic funding is mainly for HR, infrastructure, and program management, rather than for commodities and treatment, which is the largest program expenditure, or for critical prevention services, all of which are financed by donors.
- In addition to ensuring availability of future funds for the response, poor absorption capacity is a barrier to scaling up and realizing the NSP.

CHAPTER 3. INVESTMENT CASE 2.0 FRAMEWORK AND METHODOLOGY

The investment case framework 2.0

The investment case 2.0 puts forward a framework for how Tanzania can meet its national strategic goals under the current paradigm of significant target gaps and uncertain donor financing. Even if donor funds stay at current levels, identifying new approaches for optimizing the impact of the limited available funds will be necessary. If donor funds continue to decline, domestic resource mobilization and optimization will both be critical determinants of the future of the response. *Figure 3-1* summarizes this framework and more detail is provided below.

As a baseline reference point, the investment case starts by examining the expected cost and impact of maintaining the current national program. Maintaining current levels of HIV treatment (ART) coverage and current scale of prevention programs will not make significant additional progress toward national strategic goals. Maintaining ART coverage level will also have a steadily increasing cost, since the total number of PLHIV will continue to grow.

Next, the investment case estimates the cost of striving for the national strategic goals using the current program design (i.e. scaling up currently implemented interventions according to the approaches and coverage targets described in the national strategy documents (NMSF IV and HSHSP IV). This program design was influenced by recommendations on optimization from IC 1.0. This scenario comes close to achieving strategic goals for annual AIDS deaths and new infections, but at a very high cost.

In Tanzania, the combined expected domestic and donor funding level for the HIV Program will likely be lower than the funding needed to achieve these strategic goals at the high price tag, resulting in a resource gap. Given the resource gap, the future of the Tanzania HIV response will depend on the ability of the national program to adapt and become even more efficient with available funds, by allocating resources to interventions and regions that achieve the greatest impact per dollar spent and by finding ways to deliver critical interventions at a lower unit cost.

The projected impact of achieving optimization at scale within the best- and worst-case estimates of future available resource is then estimated. Given that PEPFAR and Global Fund both have indicated that it is unlikely funding for Tanzania will increase, the best-case scenario assumes funding remains at levels seen in the Constant Coverage scenario for 2019-2030. The worst-case scenario is that donor funds will decline steadily, about 20% from 2019-2030.

Under this worst-case scenario of declining donor funds, we explore the potential of increased domestic financing of the HIV program to fill the anticipated gap.

In light of high incidence among AGYW and testing recognized as critical challenges for the national program, special attention is given to the strategies for scaling up these programs, the resources required to do so, and the impact that would be achieved from these investments. Both a comprehensive package of AGYW prevention interventions and targeted testing strategy are considered in the Optimization exercise but only more efficient testing was found to be cost-saving or cost-effective compared to other investments. Scale up of AGYW interventions is explored in Chapter 8 as these investments may be from justified from beyond a cost-effectiveness lens, but based on equity and sustainability.

Figure 3-1. Investment case 2.0 framework
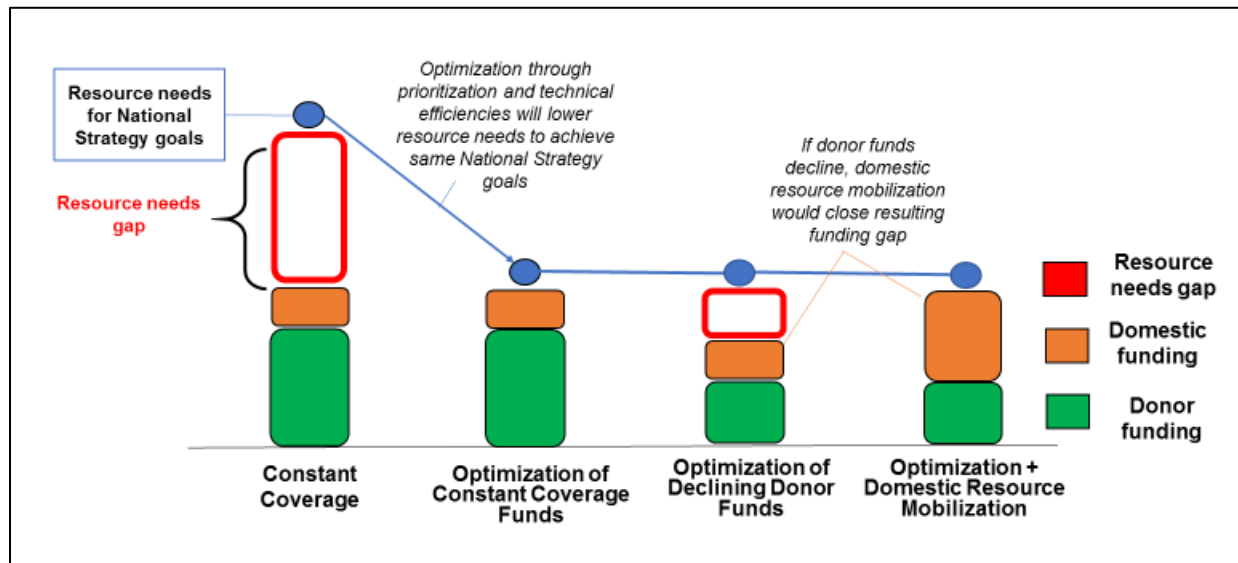
Investment case methodology

Scenario design

The investment case methodology is based on modeling and analysis of defined scenarios, comparing various "futures" for the HIV response in Tanzania and assessing their benefits, costs, trade-offs, and implications. IC 2.0 uses modeling to understand the implications and consequences of two target driven and three resource-constrained scenarios aimed at helping Tanzania reach 95-95-95.

When a scenario is *coverage-driven*, the model's first priority is to reach these coverage goals and the costs of doing so are then calculated. On the other hand, in a *funding-driven scenario*, the modelling must work within a fixed resource envelope and the feasible coverage and health outcomes within this envelope are calculated.

Traditionally, coverage driven scenarios have been the heart of investment cases, establishing and advocating for funding levels to achieve coverage and outcome targets.

In IC 2.0 the Constant coverage and National Strategy Scenarios are coverage-driven and are presented first. The Constant coverage (CC) represents the costs of inaction and is defined by constant ART program coverage, with no additional efficiencies achieved. The National Strategy (NS) scenario represents Tanzania's current national targets and priorities for reaching 90-90-90. Built based on the NMSF IV and HSHP IV and the IC 1.0, the NS already assumes what an optimized program package would be like if there were no resource constraint. Given the anticipated funding gap for achieving the NS though, three funding-constrained scenarios are examined to identify how lower funding levels could be further optimized to achieve similar NS impacts – one maximizes allocative and technical efficiency with funding levels needed to at least maintain current coverage levels (Optimization – Constant Coverage Funding); a second one maximizes impact with declining funds, assuming that donor financing falls and

domestic financing remains unchanged (Optimization – Declining Donor Funding), representing the worst-case possibility for funding; and the third scenario maximizes coverage and outcomes with falling external financing but gradually increasing domestic financial outlays, depicting a situation where the government steps into the breach to make up for decreases in donor support to Tanzania (Optimization – Domestic Resource Mobilization). Under Optimization, these funding constraint scenarios maximize coverage for ART and prevention within available resource envelope to get as close as possible to National Strategy goals.

The CC and NS scenarios are presented in chapter 4, the O-CCF scenario in chapter 5, the O-DDF scenario in chapter 6, and the O-DRM scenario in chapter 7. These five scenarios are described in more detail in *Figure 3-3* below.

Figure 3-3. Summary of Investment case 2.0 scenarios

Scenario	Abbreviation	Driving question of scenario	Scenario constraint			Optimization		Increasing domestic resource mobilization
			Coverage or funding constraint driven?	Coverage constraint	Funding constraint	Prioritization	Technical efficiencies	
Constant coverage	CC	What impact will be achieved if current program coverage levels remain static?	Coverage	2018 coverage levels	--			
National strategy	NS	What will it cost to achieve the national strategy?	Coverage	National strategic targets	--			
Optimization- Constant coverage funding	O-CCF	If technical efficiencies and prioritization of funds are pursued to optimize Constant Coverage resources, how far can base funding be maximized?	Funding constraint	--	Resource envelope of Constant Coverage scenario (USD 6.0 B)	✓	✓	
Optimization- Declining Donor Funding	O-DDF	If donor funding declines dramatically, what is the maximum impact that can be achieved even when considering Prioritization + Innovations?	Funding constraint	--	Declining donor resources, constant government resources (USD 4.6 B)	✓	✓	
Optimization -- Domestic Resource Mobilization	O-DRM	If donor funding declines but the government increases its contributions, what impact would be possible after considering prioritization and innovations?	Funding constraint	--	Declining donor resources, increasing government resources (USD 5.3)	✓	✓	✓

The rest of this chapter is devoted to a brief overview of the methods and data behind for the investment case analyses.

Impact modeling

The modeling software Goals-Spectrum was used to develop and assess the impact of the scenarios. Goals-Spectrum is already well known in Tanzania, and has been used for previous modeling exercises including IC 1.0. More information on Goals is available in Annex 3 to this report and from Avenir Health (Stover 2011). In addition to the main Goals-Spectrum modules, two new modules were used to conduct sub-analyses on AGYW and testing.

Cost estimation

The Goals model was also used to estimate the future costs of the scenarios from 2019-2030. Goals calculates the cost of achieving specified levels of coverage by multiplying the size of the target population by the expected coverage level. These unit costs are shown in Annex 5.

Unit cost data collection and validation for the Investment Case 2.0 was supported by concurrent work by Avenir Health to develop a Tanzania unit cost database, funded by the Bill and Melinda Gates Foundation. Avenir worked with Dr. Yahya Ipuge, who collected cost data from published literature, grey literature and programmatic data. All data from the Global Health Cost Consortium Unit Cost Study Repository (GHCC UCSR) online was included in the database. Dr. Ipuge has since worked with TACAIDS to hand over the database and to assess how this could best be used and sustained in Tanzania.

Optimization approach

Prioritization of prevention interventions (Allocative efficiency)

Prioritization is a form of allocative efficiency with two dimensions. The first dimension involves allocating available funds across interventions based on pre-determined criteria. In this optimization exercise, cost-effectiveness was used as the criterion given the resource constraints Tanzania is facing and the need to not only maintain but push program coverage higher with less resources. Then because prioritization was applied to prevention interventions, cost per infection averted of the interventions was selected as the specific criterion for decision-making.

Under this type of prioritization approach based on cost-effectiveness, some interventions may be associated with a cost-effectiveness ratio (cost per infection averted) that is too poor to justify high investment given limited available resources and the opportunity cost of not putting these limited funds towards interventions that could avert more infections for less. Decision-making based on cost-effectiveness analysis can have important limitations, especially from an equity perspective. Often it costs the most to reach the most vulnerable groups, but limiting services to these populations would be in conflict with to the goals and ethos of a national HIV program. It is necessary to understand the equity implications of allocation decisions based on cost-effectiveness, and adjust recommendations if equity is compromised.

The second dimension of prioritization is geographic prioritization. Here, funds are directed toward regions or sub-regions based on burden, ensuring that funds are going to areas where they can have the greatest impact for dollar spent.

Prioritization was performed based on cost-effectiveness in the Investment Case 2.0, given the need to maximize the impact of every dollar. The specific criterion selected was cost per infection averted.

Prioritization exercise methodology

In Tanzania, the following prevention intervention packages are included in the National Strategy and were considered for the optimization exercise:

- VMMC
- Condoms
- BCC: Mass Media and community mobilization
- PWID: Outreach and PrEP

- FSW: Outreach and PrEP
- AGYW: Cash transfers and PrEP

Prioritization was conducted through the following steps:

1. The available funding was first allocated to treatment targets to maximize ART coverage. Since there are no other options for treatment besides ART and the exercise of choosing between treatment and prevention is not ethical, prioritization was only applied to prevention interventions in the Investment Case 2.0. Allocations for ART (after assuming cost savings from technical efficiencies described below), PMTCT, OVC, and program support/enabling environment activities were held constant for this exercise. The exact remaining budget for prevention activities varied across the Optimization scenarios, depending on the assumptions on donor and domestic financing, but approximately it was around 15% of total costs.
2. The cost-effectiveness of each individual intervention included in the prevention packages was estimated by maxing out the coverage of the intervention nationally for 2019 to 2030 in Goals-Spectrum and calculating the associated costs and benefits for a cost-effectiveness ratio. The results are shown below in *Figure 3-4*.

Figure 3-4. Cost-effectiveness analysis results for scaling prevention interventions in Tanzania 2019-2030

Intervention	Cost-effectiveness (Cost per infection averted 2019-2030)
Condoms	-1,900 (Cost-saving)
VMMC	1,200
FSW-Outreach	3,600
BCC- mass media	5,000
MSM-PrEP	12,100
BCC- youth community mobilization	24,700
PWID-Outreach	27,000
MSM-Outreach	29,000
PWID-PrEP	39,000
PrEP (High risk)	103,000
AGYW- Cash transfers	375,000
PrEP (Medium risk)	637,00
PrEP (Low risk)	1.34 M

3. The remaining prevention budget was allocated to one intervention at a time in order of cost-effectiveness. The full required budget for each intervention was filled before moving to the next intervention. The number of prevention interventions that could be funded varied across optimization scenarios, depending on the available resource levels.
4. Note: resource requirements for PMTCT and VMMC decline over time as there are HIV-positive pregnant women and VMMC coverage is saturated. When this happens, funds are then allocated to the interventions that follow in cost-effectiveness.
5. In some cases, cost-effectiveness decision criteria was overridden in the interest of equity. In these instances, funding for interventions considered critical for preserving equity were maintained at minimum levels.

Prioritization by geography

Currently, PEPFAR prioritizes resources based on a triangulation approach, using survey and epidemiologic data, program results, and field experiences. Councils are classified according to 3 categories:
- Attained (>90% ART)
- Scale-Up (councils with largest number of PLHIV accounting for 80% of total)
- Sustained (remainder, lesser HIV burden)

Resources are targeted to scale-up councils to maximize impact of every additional prevention dollar spent. *Figure 3-5* below shows incidence by PEPFAR council categorization.

Figure 3-5. Incidence among population 15-49 by PEPFAR council categorization
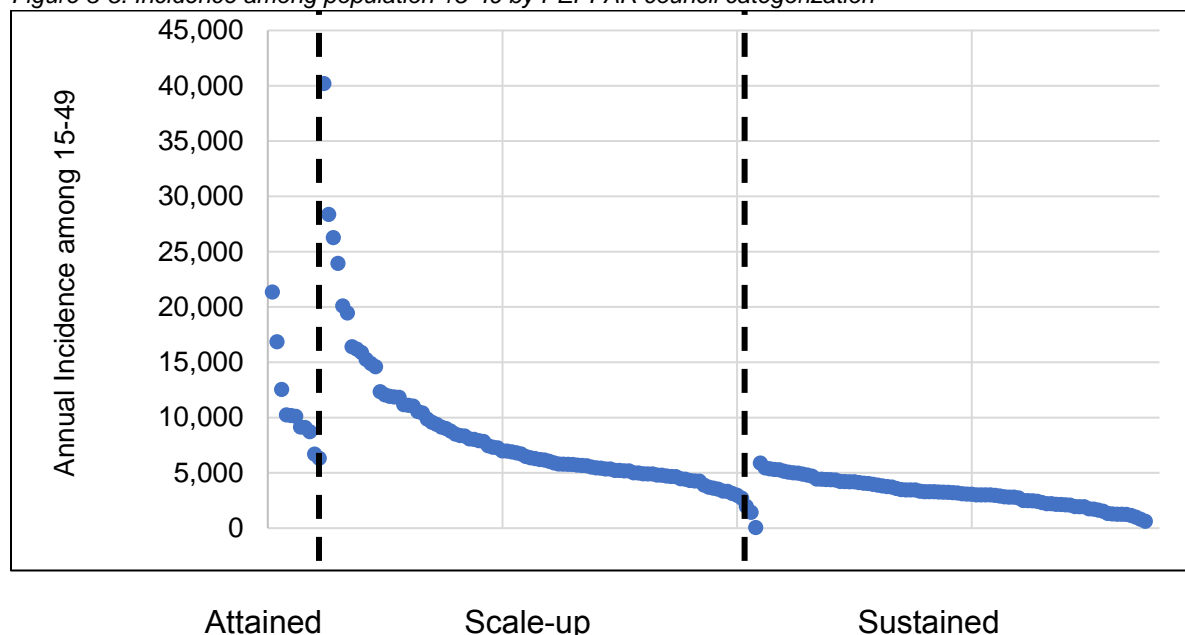
The Goals-Spectrum model used updated council epidemiological information and the most recent unit costs to assess which councils would have the lowest cost per infection averted and recommend which councils should be prioritized moving forward. When these results were compared to the current geographic allocation of PEPFAR funding, it was found that near-optimal geographic had already been achieved. This finding was surprising but reflects the effectiveness of previous geographic prioritization efforts by PEPFAR and government partners. Annex 6 shows the results from the geographic prioritization exercise.

Technical efficiencies in ART delivery

In IC 1.0 actions that could help increase coverage (e.g., adherence clubs, scaling up cash transfers, scale-up of index testing) but would at the same time require greater financial outlays were also included in the IC 1.0 description and modeling of innovations. Progress on these is described in *Figure 2-8*.

In IC 2.0, technical efficiencies were limited to only those actions that would reduce the unit cost of delivering HIV services so that more service coverage can be achieved with the same amount of money, or the same level of coverage can be reached while spending less and saving money. These included

new or shifted policies (e.g., VL monitoring frequency, use of multi-month ARV scripts) or technology changes (e.g., introduction of new ARV combinations) that would achieve the same or greater impact for a lower cost. The list of technical efficiencies used in IC 2.0 is described in Annex 6, and the calculation of savings is shown in Annex 7.

Efficient testing strategy

To identify a cost-effective testing strategy to reach the first 90 target and assess the related costs, the new Spectrum-Goals testing module was used. This new module has been incorporated into the impact model described in Annex 3.

The new testing module first identifies a possible screening strategy to reach the target of 90% of PLHIV aware of their status by 2025. This module uses previous program yield data and known unit costs to assess the cost-effectiveness of various screening modalities (VCT, PITC, community-based screening, self-testing) targeted at specific population groups and then identify the most cost-effective strategy combination of modality to reach the set testing target (the first 90 in the case of Tanzania). The module calculates both the annual volume of tests for each modality required and also the associated costs of implementation at scale.

Resource mobilization

In IC 2.0, domestic resource mobilization options are explored, using macroeconomic and fiscal analysis and comparison to other country benchmarks, and weighing a range of options including general taxation, government health insurance, and earmarked resources channels through special-purpose funds (see Chapter 7).

Targeted program analyses: AGYW

Because AGYW interventions were not prioritized on the basis of cost-effectiveness in the Optimization exercises, Chapter 8 of IC 2.0 is devoted to discussing the costs and benefits of scaling-up a comprehensive package of prevention interventions to address the critical challenge of increasing incidence among AGYW. For this analysis, another new Spectrum-Goals module was used that was designed specifically as a tool for guiding AGYW program scale-up.

The comprehensive AGYW package was defined as condom use, PrEP, comprehensive sexuality education, and economic empowerment. Interventions for ABYM included VMMC. These interventions are scaled up in high and medium incidence regions to a higher degree than called for in the NS or Optimization scenarios. To do this, preliminary guidance from UNAIDS was used to set targets for high, medium, and low incidence districts. The additional costs and impacts of this expanded AGYW effort were then estimated. Coverage of ART and other prevention interventions was maintained at 2018 levels. The impact and costs of the AGYW scale-up scenario are compared to the impact and costs of the other scenarios.

Key assumptions and limitations of IC 2.0

Key assumptions of the IC 2.0 modeling and analysis include:

- Available data is representative and of high quality
- No new donor partners will emerge
- Funding allocation across interventions is not rigid but can be shifted

Key limitations include:

- The National Strategy had not been costed in a bottom-up manner at the time of this study. The Goals model was used to estimate the costs but a detailed costing of the Strategy should be done for budgeting and implementation purposes
- Data on financial expenditure is not harmonized across government and external partners. UNAIDS and the Bill and Melinda Gates Foundation were funding a harmonization cross-walk exercise at the time of this study, but it was not completed in time to use
- Unit cost data was of variable quality, with some estimates being outdated and other cost data not being available.
- Although many behavioral and enabling interventions are recognized as important, their direct effects on HIV transmission are not well established and thus not included in the Goals model.

Data sources (see References)

Epidemiological and programmatic data. Key data sources for epidemiological and program data included:
- National household surveys
- AIS 2003/4
- HIV/AIDS and Malaria Survey 2007-8, 2011-2012
- DHS 2010, DHS 2015-16
- THIS 2016-17
- Tanzania Fourth NMSF for HIV/AIDS 2018/19 – 2022/23
- Tanzania HIV Investment Case, Reference Report, November 2016

Financing data. Key data sources for financing data included:
- National AIDS Spending Assessment
- Global Fund Funding Request 2016
- Global Fund expenditure data 2011-2016
- PEPFAR COPs (available up to 2018)
- PEPFAR planning letter
- PEPFAR expenditure data 2014-2018

CHAPTER 4: CONSTANT COVERAGE VS NATIONAL STRATEGY

Constant Coverage Scenario

Given the current program gaps and ambitious targets, if Tanzania's program remains stagnant under Constant Coverage, missed opportunities and negative consequences in terms of new infections and mortality will be severe.

Modeling assumptions

The Constant Coverage Scenario assumes that coverage would be maintained at 2018 levels. Since Tanzania's populations continues to grow, the resources required to maintain these coverage levels increase slightly over time.

Figure 4-1. Modeling assumptions for Constant Coverage Scenario

Abbreviation	CC	
Coverage of budget driven scenario	Coverage-driven	
Coverage targets	Constant coverage: 57% ART coverage among all PLHIV; 70% among adults 15 years + (2018); Coverage of prevention intervention kept at 2018 levels	
Resources required (preview of results)	Resources required in 2019	USD 461 M
	Resources required in 2030	USD 500 M*
	Cumulative resources (2019-2030)	USD 5.8 B
Optimization	No optimization approaches scaled	

Impact of Constant Coverage

The impacts of the Constant Coverage scenario represent the costs of inaction—what will occur in the absence of program scale-up from optimization or additional resource mobilization.

ART coverage. In 2017, ART coverage among all PLHIV was 57% and 70% among adults 15 years and older. The Constant Coverage scenario maintains this coverage, even with population growth and HIV incidence staying at high levels. As a result, Constant Coverage (as a percentage of all PLHIV) would mean that the absolute number on ART would increase from 1.06 M in 2019 to 1.1 M PLHIV in 2030.

New infections. If Tanzania only maintains constant coverage, 533,000 new infections will occur from 2019-2030. Annual new infections will stay relatively constant. In 2019, annual new infections will be 44,903 compared to 44,000 in 2030, a 2% reduction. This means Tanzania would fall significantly short of the Fast Track target of a 90% reduction in new infections from 2010 to 2030 with only a 55% reduction in this time period. Constant Coverage would be particularly bad news for new infections among adolescents. New infections would increase from 12,000 annually in 2019 to 13,000 in 2030, a 9% rise.

Figure 4-2. New infections 2019-2030
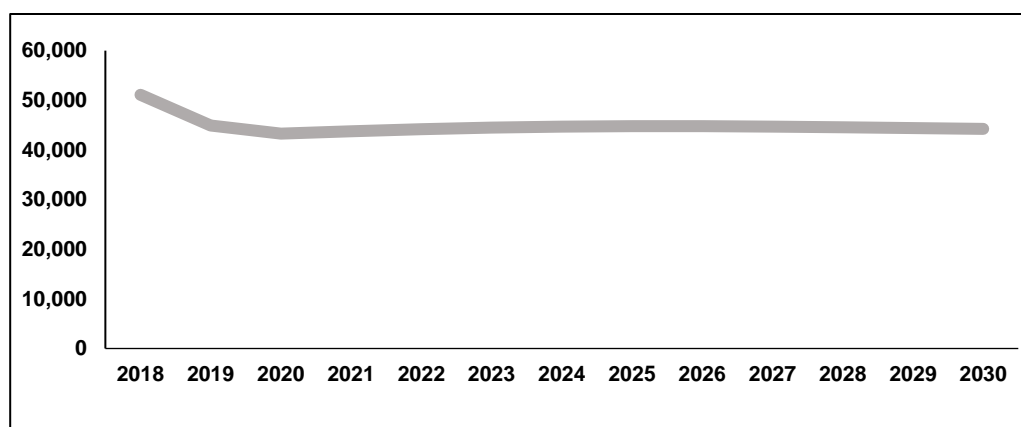
AIDS-related deaths. In a reversal of past progress, AIDS-related deaths would increase under Constant Coverage from 28,000 annually in 2019 to 38,588 annually in 2030. In total, 408,000 AIDS-related deaths would occur from 2019-2030. Tanzania would see only a 53% reduction in AIDS-related deaths from 2010-2030, again falling significantly short of the Fast Track 90% mortality reduction target.

Figure 4-3. AIDS-related deaths 2019-2030
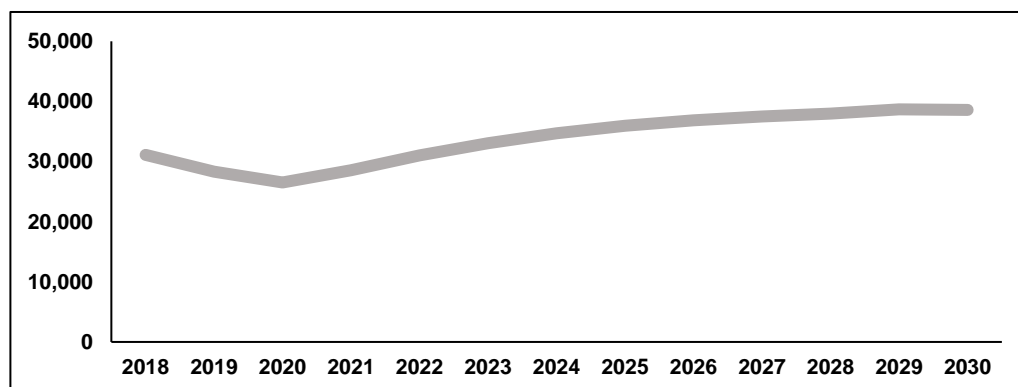
Life expectancy. Under Constant Coverage, average life expectancy would increase from 66.8 years in 2019 to 67.03 years in 2020, 67.7 years in 2025, and 68.88 years in 203. The effect of increasing incomes and overall improved access to healthcare on life expectancy during this time period would outweigh the rise in AIDS-mortality.

Costs of Constant Coverage

Costs to maintain Constant Coverage would increase from USD 461 M in 2019 to USD 500 M in 2030. Given that external funding for HIV is not likely to increase, this increase would have to be funded from domestic sources. In most HIV investment cases, Constant Coverage is the conservative financing scenario, but in the Tanzanian context even maintaining spending levels in this scenario will be challenging.

Takeaways of Constant Coverage

If only Constant Coverage is maintained, the impacts of inaction are that ART coverage will not grow; annual new infections will stay approximately at current levels; annual AIDS-deaths will increase; and Tanzania will fall significantly short of Fast Track targets (*Figure 4-4*).

Figure 4-4. Progress towards Fast Track Targets of Constant Coverage Scenario
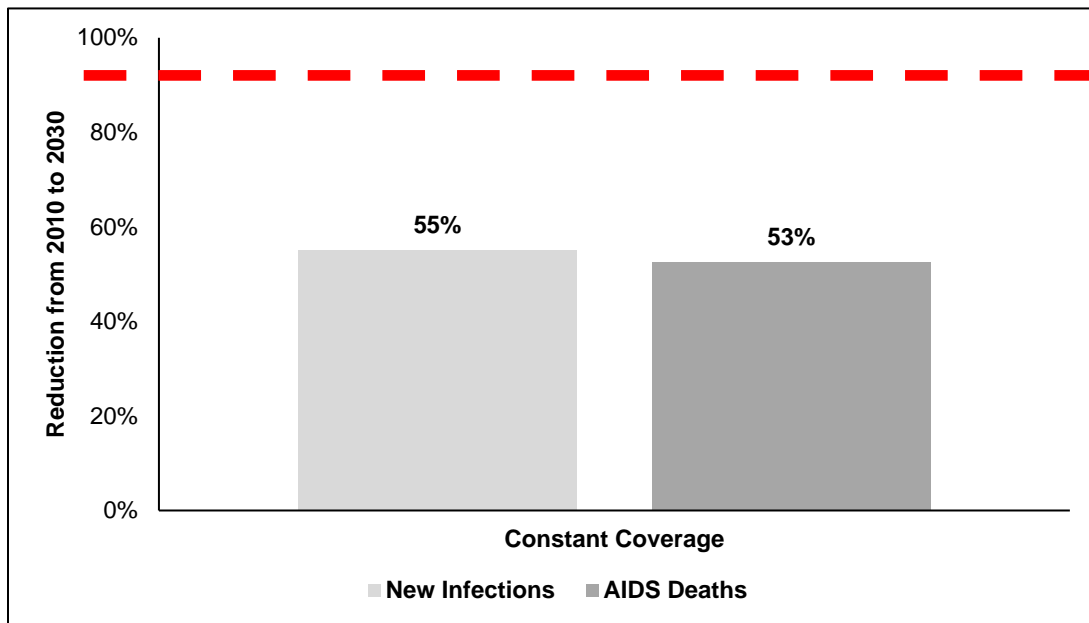
It is clear that this scenario is not a desirable option for the future of the national HIV program. But, luckily the Government and partners have committed to additional scale-up and further Optimization strategies.

The National Strategy Scenario

Context: Ambitious national goals.

The leadership of the HIV response has committed to doing more than maintaining constant coverage and the program as is. NACP and TACAIDS have both released updated national strategic plans to guide the national response through 2023: The Health Sector HIV Strategic Plan 2017-2022 (HSHSP IV) and the National Multisectoral Strategic Framework 207/18-2022/23 (NMSF IV). These have been described in Chapter 2.

Figure 4-5 below gives the coverage targets for key intervention such as HTC, ART, and PMTCT laid out in these two national strategies. These targets are broadly consistent across the two strategy documents. Both strategies achieve 90-90-90 targets by 2020. The NMSF IV is more ambitious for 2022-2023, aiming to achieve 95-95-95 targets compared to 90-90-90 for the HSHSP IV.

Figure 4-5. Key programmatic targets of national strategies

	NMSF IV	HSHSP IV
Treatment		
First 90: HTC (among all PLHIV)		
2020	90%	90%
2023	95%	90%
Second 90: ART coverage (among PLHIV who are aware of their status)		
2020	90%	90%
2023	95%	90%
Third 90: Viral load suppression (among PLHIV on ART)		
2020	90%	90%
2023	95%	90%
Prevention		
PMTCT coverage		
2020	100%	99%
2023	100%	99%

Sources: National AIDS Control Program. Health Sector HIV and AIDS Strategic Plan (HSHSP IV) 2017-2022. 2017; The Government of the United Republic of Tanzania. Tanzania Fourth National Multi-Sectoral Strategic Framework for HIV and AIDS (2017/18-2022/23). 2017

Modeling assumptions

Figure 4-6. Modeling assumptions of National Strategy Scenario

Abbreviation	NS	
Coverage of budget driven scenario	Coverage-driven	
Coverage targets	National strategy (See *Figure 4-4*); When one target was higher than the other, then the higher target was used for this scenario	
Funding constraint	*PEPFAR*	NA
	Global Fund	NA
	Domestic	NA
Resources required (preview to results)	Resources required in 2019	USD 510 M
	Resource required in 2030	USD 839 M
	Cumulative resources required (2019-2030)	USD 8.1 B
Optimization	No optimization approaches scaled beyond their baseline described in National Strategies	

Impact of National Strategy

ART coverage. Implementing the NS would require quickly increasing the numbers on ART from current coverage levels. In 2020, under the National Strategy 1.22 M PLHIV would be on ART, rising to 1.27 M by 2025, and1.34 M by 2030, an increase of 20% compared to Constant Coverage.

Figure 4-7. Number on ART 2019-2030
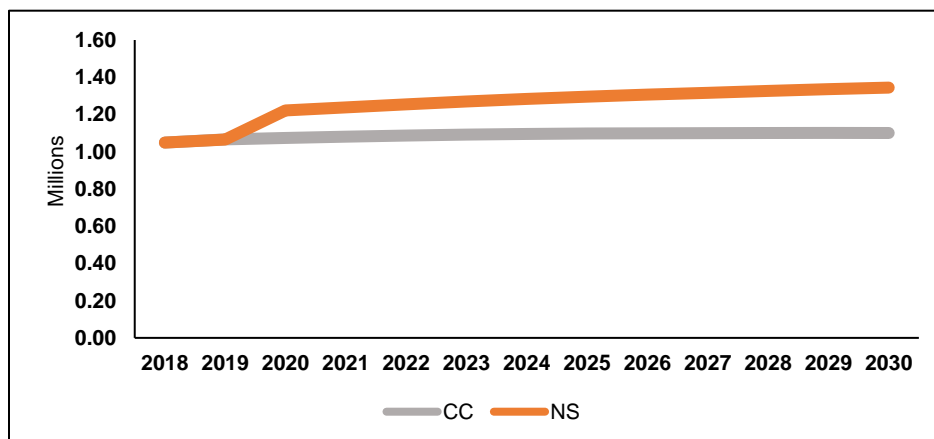
New infections. Achieving the NS would significantly alter the trajectory of the epidemic in terms of new infections. The National Strategy would avert an extra 255,000 infections compared to CC, reducing the cumulative number of new infections by about 50%. From 2019 to 2030, the number of new infections annually would decrease by 72% under the NS, from over 44,000 annually in 2019 to 14,000 in 2030. This continued decline would get Tanzania close to meeting Fast Track targets (85% reduction from 2010 to 2030).

Figure 4-8. New infections 2019-2030
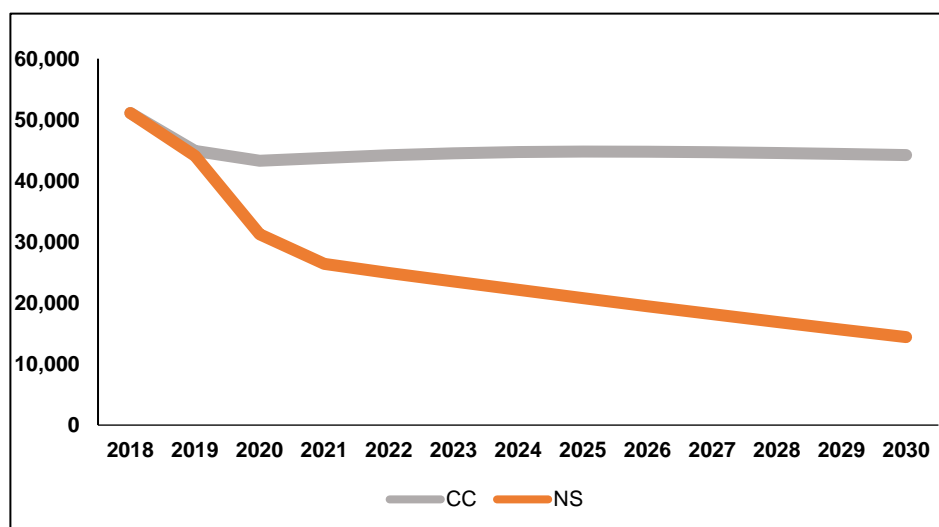
NS would also reverse the trend of new infections among adolescents compared to Constant Coverage. The number of new annual infections among adolescents would decline by 67% under the NS, from about 12,000 in 2019 to under 4,000 in 2030.

AIDS-related mortality. The National Strategy would also alter the course of AIDS-related deaths. While AIDS-related deaths would increase under Constant Coverage, annual AIDS-related deaths would fall 56% from 2019 to 2030 under the NS. The NS still would not reach the Fast Track target of a 90% reduction in mortality from 2010-2030, but would get much closer at a reduction of 83% by 2030.

Figure 4-9. AIDS-related deaths 2019-2030
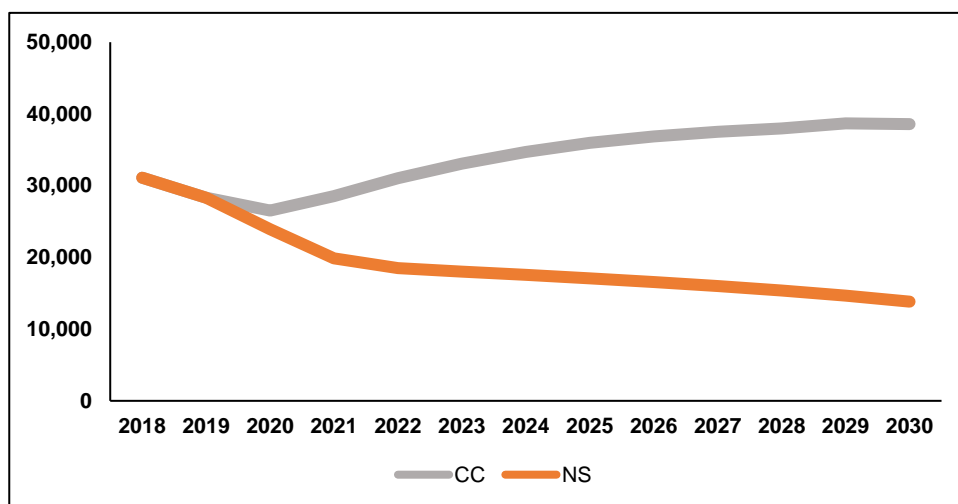
Life expectancy. The National Strategy's impact on AIDS-mortality would lead to on average one additional year of life for Tanzanians by 2025 and 2030, compared to CC. In 2025 under the NS, the average life expectancy would be 68.52 years (67.7 years under CC) and 69.82 years in 2030 (68.88 years under CC). This increase in life expectancy demonstrates the broad benefits that investing in HIV can have on the well-being and productivity of a society.

Costs of National Strategy Scenario

The impacts of the National Strategy are significant but come at a high price tag. The cumulative cost of the NS is USD 8.1 billion from 2019 to 2030, an increase of USD 2.3 B relative to the CC scenario. By 2030, the resource needs of the HIV program would reach USD 839 million, as compared to USD 500 M in the CC scenario (*Figure 4-10*).

Figure 4-10. Resource needs for National Strategy vs Constant Coverage 2019-2030
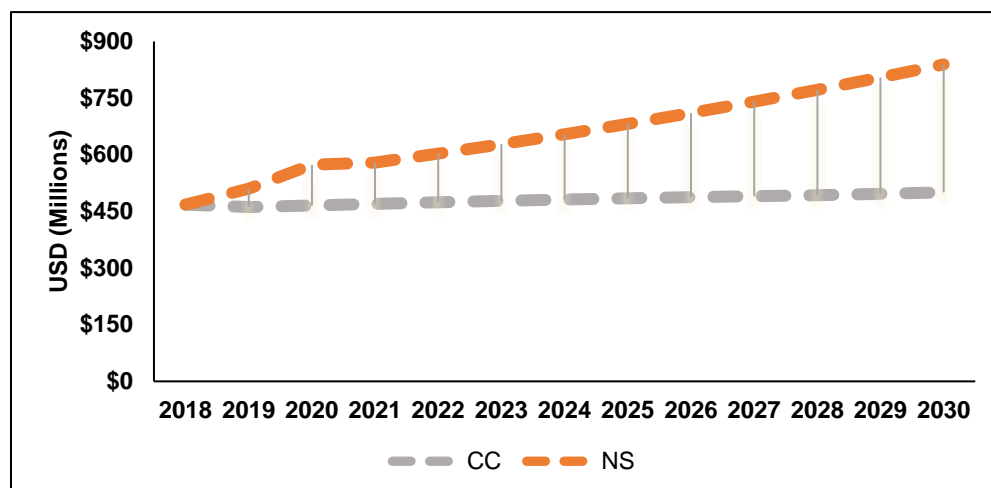
Figure 4-11. Cumulative and 2030 resource needs of CC and NS

	CC	NS
Cumulative resource needs 2019-2030 (USD M)	5,783	8,097
Resource needs in 2030 (USD M)	500	839

Compared to the Constant Coverage scenario, the National Strategy would require an additional USD 48 M in 2019, and these additional requirements would rise to USD 339 M in 2030 (*Figure 4-12*). Given the current context where the prospects for additional funds are unfavorable, it seems questionable whether this gap can be filled.

Figure 4-12. Additional resources required by National Strategy compared to Constant Coverage 2019-2030
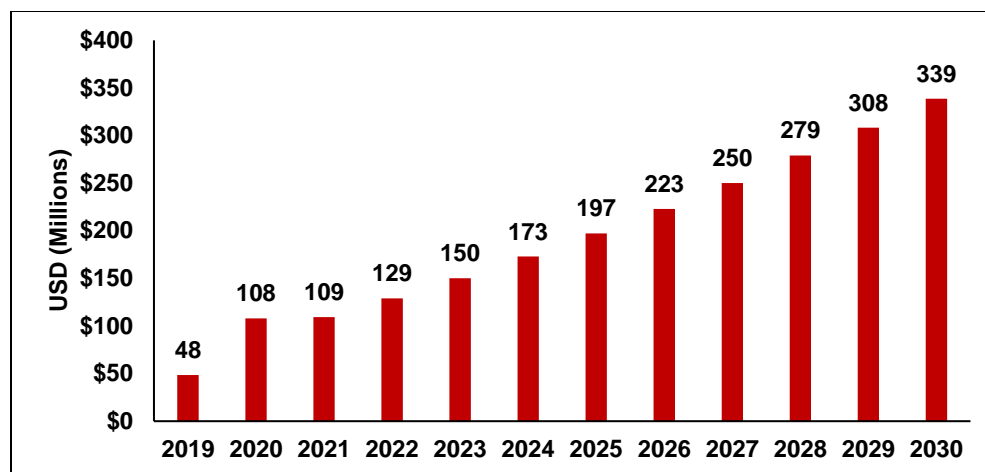
Cost-effectiveness of National Strategy

Compared to Constant Coverage, the National Strategy is associated with an incremental cost-effectiveness ratio (ICER) of USD 9,075 per additional infection averted.

Figure 4-13. Cost-effectiveness of National Strategy vs Constant Coverage Scenario

	Total cost (USD M)	Incremental cost (USD M)	Infections 2019-2030	New infections averted	ICER (USD per additional infection averted)
CC	5,783	--	533,000	--	--
NS	8,097	2,314	278,000	255,000	9,075

Takeaways of National Strategy

The National Strategy Scenario -- an amalgam of the National Multisectoral Framework IV and the Health Sector HIV Strategic Plan -- if implemented and financed as designed would achieve significant impact. New infections would fall rapidly, by 72% from 2019 to 2030. AIDS-related deaths would also fall dramatically by more than 50% to less than 15,000 annually by 2030. These important reductions would mean Tanzania would reach or get close to Fast Track targets for new infections and mortality. However, these gains would have a high funding price tag and do not represent a cost-effective mix of investments. By 2030, the NS is estimated to cost 80% more than the current HIV program at almost USD 850 M annually. Given the current financing environment where maintaining current funding levels is proving to be challenging, the NS will be hard to pay for unless donors and government both significantly increase their budgets beyond current amounts.

Figure 4-14. Summary of impact of Constant Coverage vs National Strategy

	CC	NS
New infections (All adults)		
Cumulative new infections	533,000	278,000
New infections in 2030	44,000	14,000
Percent change 2019-2030	-2%	-72%
Fast Track target (Percent reduction 2010-2030)	-55%	-85%
New infections (Adolescents)		
Cumulative new infections	150,000	75,000
New infections in 2030	13,000	4,000
Percent change 2019-2030	+9%	-67%
AIDS-related deaths		
Cumulative deaths	408,000	220,000
Number of deaths in 2030	39,000	14,000
Percent change 2019-2030	+36%	-56%
Fast Track target (Percent reduction 2010-2030)	-53%	-83%
Number on ART		
Number on ART in 2030	1.10 Million (68% of PLHIV)	1.34 Million (87% of PLHIV)
Resources needed		
Cumulative resources needed 2019-2030	5,783	8,097
Resources needed in 2030	500	839

CHAPTER 5: ACHIEVING NATIONAL GOALS MORE EFFICIENTLY

The impact that would come from the National Strategy would change the course of the epidemic and prevent hundreds of thousands of new infections and deaths -- if it could be financed. But the resource needs for the National Strategy are very high, perhaps even prohibitive, given Tanzania's financing outlook. Current spending levels are half of what would be required for the National Strategy in 2030 and the prospects for obtaining large amounts of additional HIV funds are doubtful. Under these conditions, one option would be for the country to pursue greater efficiencies, making the money go further than it does today.

Is this possible? Can Tanzania more efficiently further optimize limited available funds? Efforts to optimize parts of the response have already been introduced—especially by PEPFAR who has pushed geographic prioritization and innovations in delivery modalities, such as multi-month scripts for stable patients and improved, more cost-effective first-line treatment regimens, i.e. Dolutegravir-based regimens. In this chapter, we explore how optimization at scale might happen, and apply such an optimization algorithm to the HIV funding available under the Constant Coverage scenario to see what impact these funds could have beyond simply maintain the status quo. This is the Optimization – Constant Coverage Funding (O-CCF) Scenario.

Two modalities for optimization are considered – prioritizing or allocating funds more efficiently, and technical efficiency measures achieved through technological or policy changes that reduce the unit cost of interventions.

Prioritization of prevention spending

Prioritization of prevention interventions

The Constant Coverage funding envelope would leave about USD 50-70 million annually for prevention interventions (about 10-15% of total resources). To maximize the impact of these limited prevention funds from 2019-2030, additional efforts could be made to shift funding towards the most cost-effective programs. The cost-effectiveness analysis showed that these interventions would be female sex workers, condom provision, VMMC, and mass media. As these programs scale, the programs found to be less cost-effective would have to be partially scaled-back or paused to free up additional funds. Community mobilization and PrEP activities should be paused under this approach given that their baseline coverage is low and their cost-effectiveness is not favorable to justify scale-up compared to other prevention interventions. Cash transfers for AGYW and outreach for MSM and PWID would remain at levels to maintain current programs but would see proportional allocation reductions as FSW, VMMC, and condom interventions require more funds. The benefits and costs of additional investments in AGYW comprehensive prevention is discussed in Chapter 8 given that AGYW are a priority population and additional investments may be justified from an equity lens. *Figure 5-1* shows the relative resource shifts for prevention funding for 2019-2030.

Figure 5-1. Constant Coverage vs Optimization-CCF Resource Allocation 2019-2030 (Prevention Interventions)
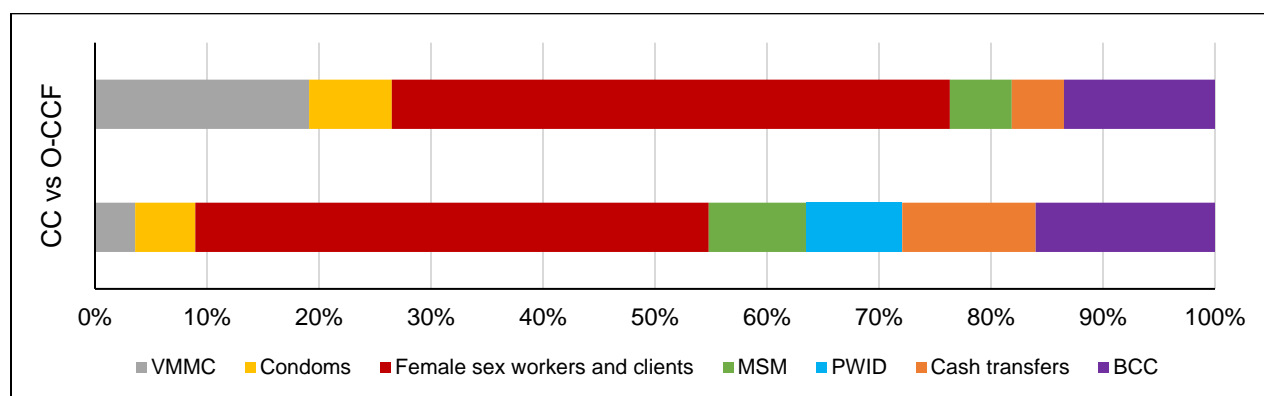
The allocation shifts towards the more cost-effective interventions would occur gradually from 2019-2030. The FSW outreach funding would start by growing 1 M from 2020 to 2021, and then each year thereafter the budget increment would grow by approximately 1 M (increase of 2 M in 2022, 3 M in 2023, 4M in 2024, etc). In total, FSW outreach would grow from USD 20 M in 2019 to USD 40 M in 2030. VMMC funding would increase significantly in the early years, but then would fall as coverage is saturated. In the later years as a new cohort of young males comes of age, VMMC funding would start to increase again, by about 0.5 M annually starting in 2022. The increase in the condom allocation would be the most gradual, growing by about USD 250,000 annually beginning in 2021. Even though these budget increases are at a slow pace, they could be significant changes given they would have to be found in the budgets of other programs. This analysis does not suggest that these other programs (BCC, cash transfers, etc) are *ineffective.* If more money were available in the coming years than currently projected, then they should be funded as well. These shifts are recommended only because of the tight funding situation. A possible solution to avoid any funding reductions for MSM and PWID outreach and cash transfers could be to identify cost-sharing opportunities with other disease programs or sectors.

How the resource requirement for these interventions would change moving from CC to Optimization-CCF is shown below for the year 2030 individually and cumulatively for 2019-30 (*Figure 5-2*).

Figure 5-2. Allocative efficiency recommendations for prevention interventions

	2030 (USD M)		Cumulative 2019-2030 (USD M)	
	CC	O-CCF	CC	O-CCF
Prioritized prevention interventions				
Condoms	4	7	36	53
VMMC	0.05	13	0.5	138
FSW- Outreach	21	40	310	358
De-prioritized programs				
MSM- Outreach	6	1	60	40
BCC	11	11	108	97
PWID-Outreach	6	1	58	<10
AGYW-Cash transfers	8	--	81	33
PreP	-	-	-	-

The cost-effectiveness values were based on Tanzania unit costs, so it is possible that the relative cost-effectiveness of the interventions could change over time. This prioritization analysis could be re-assessed in the future.

Prioritization of geographies

As described in Chapter 3, given the efforts by PEPFAR and partners to prioritize by geography already, negligible additional benefits could be gained from further prioritization of primary prevention interventions. Efficiency based on geography has already been near maximized, but efficiency gains based on resource allocation can still be realized.

Technical efficiencies in ART delivery

Prioritization alone may not be sufficient to reach national goals if limited resources are available. Other ways to stretch the value of every dollar spent might be required. Another strategy would be the identification of technical efficiencies. Technical efficiencies for reducing costs in the treatment program could help, since treatment accounts for a large share of total HIV spending and treatment should not de-prioritized on the basis of cost-effectiveness for ethical reasons. The identification of these efficiencies is described in Annex 6 and the full calculations are in Annex 7.

Dolutegravir-switch

Dolutegravir (DTG) is registered in Tanzania and introduced, but it has not been scaled nationally. Switching to Dolutegravir would lower the costs of ARVs. At baseline, the average cost of first-line ARVs for adults was USD 91 per patient (without DTG) per year.[3]

In 2017, a global coalition announced a new price agreement to make a fixed-dose combination antiretroviral therapy regimen containing tenofovir, lamivudine and dolutegravir (TLD) more widely available at a reduced price in countries with some of the world's most significant HIV burden. Ministries of Health and program managers from the 92 low- and middle-income countries covered under the agreement, including Tanzania would be eligible to order TLD at a projected average price of USD 75 per person per year (UNAIDS 2017).

Assuming a reduction in first-line ARVS for adults from USD 91 to USD 75 per year, an average savings of approximately USD 15 per patient on ART per year was estimated when both first-and second-line treatment are accounted for.

This technical efficiency should be relatively straightforward for Tanzania to achieve given how it is already approved policy and being implemented. Efforts to ensure TLD is implemented at scale should be a priority.

Simplified lab testing algorithm for stable patients

PEPFAR issued recommendations for differentiated service delivery models (DSDM) as part of the COP 2016. These recommendations involved both longer ARV prescription lengths and simplified lab algorithms for stable patients at the facility-level. The full recommendations are in Annex 8. Health Policy Plus analyzed the potential cost savings of differentiated service delivery (including moving from 1- to 3-month prescriptions) and found that it could save the national program USD 250 M over 4 year (Forsythe et al 2016). In 2018, two- to three-month prescriptions were already being implemented for stable patients. In 2019, PEPFAR has plans to implement 6-month prescriptions in 3 regions. The cost savings for multi-month scripts are likely related to patient time and reduced clinic burden (which may improve

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[3] This figure was not explicitly reported but was calculated based on other assumptions

quality of care but is not likely to lower clinic operating costs) (Forsythe et al 2016). The real financial savings to (government) providers would be from implementing the full DSDM lab recommendations, which would reduce the volume of lab commodities used. For stable patients, the streamlined lab algorithm would forgo routine CD4, clinical chemistry, and hematology lab tests and would only require one viral load test annually.

On average, the savings from implementing a simplified lab algorithm for stable patients would be USD 14 on average per patient.

Differentiated care models are widely endorsed across Tanzania and progress in scaling up multi-month scripts seems to be well tracked. Progress in scaling simplified lab algorithms is less documented but could offer additional savings.

Community-based support services for stable patients

Community-based support services include peer support and support groups (adherence support, treatment literacy, well-being checks, follow-up for defaulting patients, etc). Currently, all ART support services are delivered either through facility- or a mix of facility-community platforms. The impact of community-based support services was modeled in the 2016 investment case, but only from the perspective of greater adherence. Recent evidence in Tanzania of piloting community-based support programs for stable patients has not shown improvements in retention but has confirmed cost savings. This recent study (Forsythe et al 2018) has suggested that community-based support services reduce costs compared to facility-based services and also compared to a mix of community- and facility-based services. The study suggested that the cost of supporting services per stable patient is USD 20 per patient compared to USD 45 per patient for a mix of facility-based and community-based and USD 108 for only facility-based supporting services.

Moving towards all patients receiving community-level support services could save USD 20 on average per patient. The most recent ART costing report suggests that no patients current receive exclusively community-based support services (MoHSS, CDC, and ICF, 2016a), suggesting there is significant room to scale these services.

Combined savings

In practice, these efficiencies cannot be realized overnight but will have to scaled up over time. *Figure 5-3* below shows the assumptions for how quickly these technical efficiencies could be scaled in Tanzania and what the assumed ART unit cost would be.

Figure 5-3. Assumptions on time to scale technical efficiencies and assumed unit cost

Time to scale technical efficiencies	2019	2020	2021	2022	2023 onwards
Community-based support services	0%	25%	50%	75%	100%
DTG Switch	0%	50%	100%	100%	100%
Simplified lab algorithm for stable patients	NA	25%	50%	75%	100%
ART unit cost (per patient/year) + TEs	**205**	**190**	**173**	**165**	**156**

In total, the combined savings from the technical efficiencies could be up to USD 49 per patient when fully realized, resulting in an average unit cost of USD 156 for ART per patient annually.

Figure 5-4. Cumulative reduction in ART unit cost when technical efficiencies fully realized
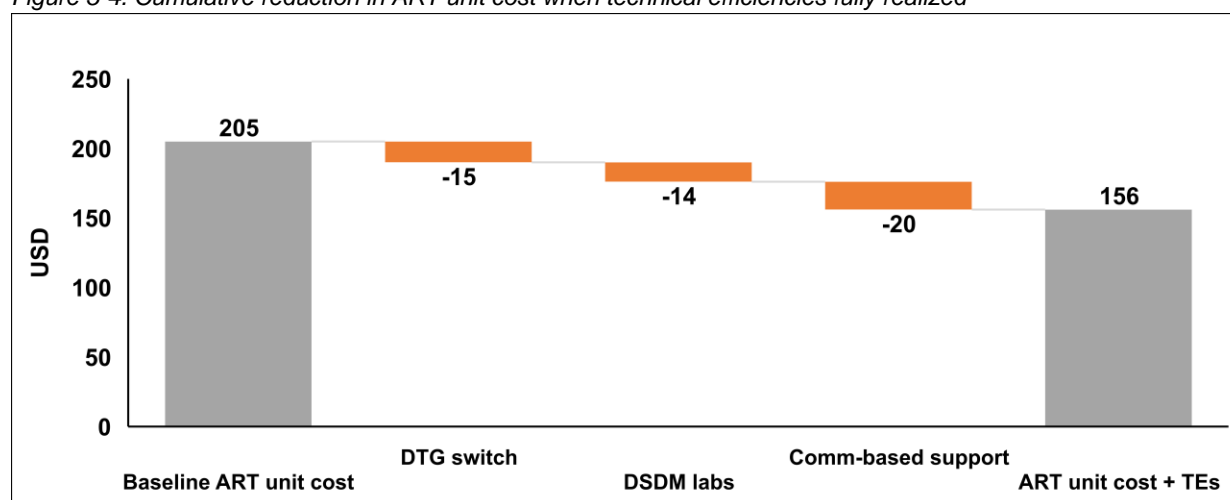
In contrast, under the CC scenario the unit cost for ART stays constant at USD 205.

Efficient strategy for targeted testing and counseling

Testing and counseling coverage is a significant program gap for Tanzania— less than 65% of PLHIV are aware of their status, significantly below national and global goals.

Low testing coverage and need for targeting

The Tanzania HIV Impact Survey found that 65% of females living with HIV, 52% of males living with HIV, and 61% of all adults 15-49 living with HIV are aware of their status. This is significantly below the goal of 90% of PLHIV aware of their status by 2020 and 95% by 2023. This is a critical bottleneck to reaching the 95-95-95 targets and he Fast Track goals since testing is a gateway for linkage to ART and also impedes prevention efforts as those unaware PLHIV continue to transmit the virus to others.

Both government and external partners have recognized the need to address this challenge and have developed strategies to improve testing coverage. The new NACP strategy includes a diversity of approaches, including PITC, index-testing, VTC, and community-based testing (NACP 2019). PEPFAR has committed to following the government strategy and is also looking to reduce PITC "over-testing" by identifying which facilities are not implementing testing recommendations with fidelity and thus inefficiency.

Scaling-up targeted testing

To improve coverage, scale-up of new, more innovative modalities and more targeted strategies will be required to reach those undiagnosed, as articulated in both NACP and PEPFAR guidance.

To complement the strategic guidance from NACP and PEPFAR, the IC 2.0 sought to estimate the costs of scaling up these targeted screening approaches.

The new Goals HIV testing module was used for this analysis. The module assesses 6 screening strategies and 15 population groups and optimizes a screening strategy to reach 90% testing coverage based on cost-effectiveness, delivery platform accessibility, and burden of disease within the population group. There are many scenarios that could lead to reaching the 90% goal, so this analysis should be seen as indicative of the level of resources required for scaling-up HTC rather than presenting firm recommendations.

Figure 5-5. Recommended HTC scale-up strategy from Goals

Population Group	PITC	VCT	Outreach	Mobile	Community-based testing (CBT)	Self-Test
Patients: Pregnant women, STI, TB, OIs, VMMC	X					
Partners: Pregnant women, partners of index cases	X					X
Key pops: FSW, MSM, PWID			X			X
Other special pops: prisoners, students	X	X		X		X
Infants	X					
Other adult men and women		X		X	X	X

Impact on testing coverage

Modeling results (*Figure 5-6)* suggest that to ultimately reach the first 90 target by 2025, the number of tests annually would need to reach about 9 M. By 2020, the number of tests would reach over 8 M and then would rise to 9 M annually in 2021. From 2022 through 2030, testing volumes would have to be maintained at between 9-10 M. Up until 2022, PITC, VCT, and self-testing would be the most cost-effective modality combination, with about 3-4 million tests to be performed by PITC and self-testing and about 800,000 by VCT. By 2022, VCT should be scaled back to only approximately 20,000 tests annually, but PITC and self-testing would need to continue at a high volume at 4-5 million tests through 2030 to keep testing coverage high as new infections occur.

Figure 5-6. Number of tests for HTC scale-up strategy
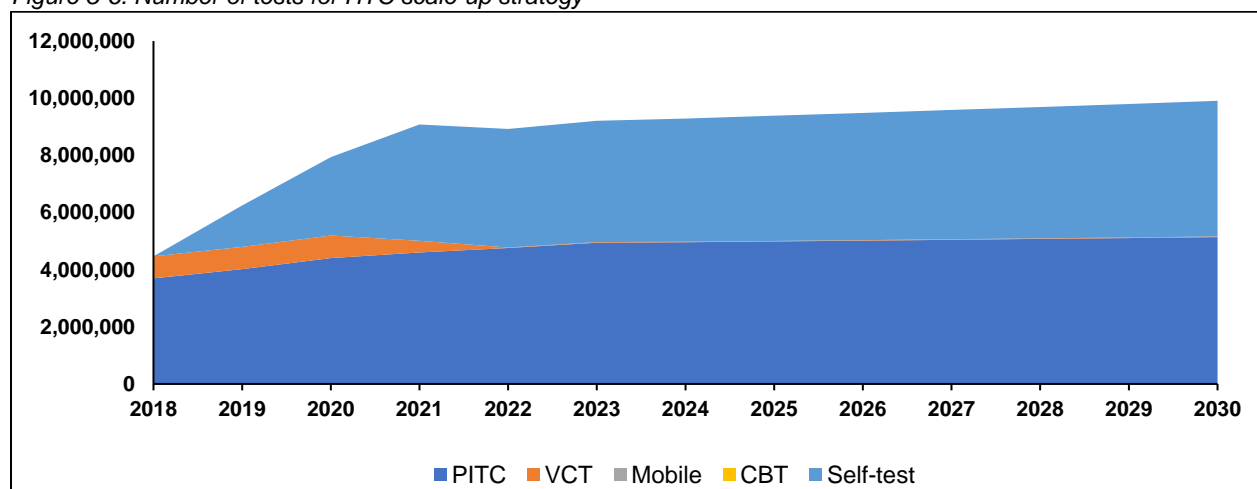
This targeted testing strategy could reach 90% of PLHIV who would know their status by 2025, as shown in *Figure 5-7.*

Figure 5-7. Percent of PLHIV who know their status 2019-2030
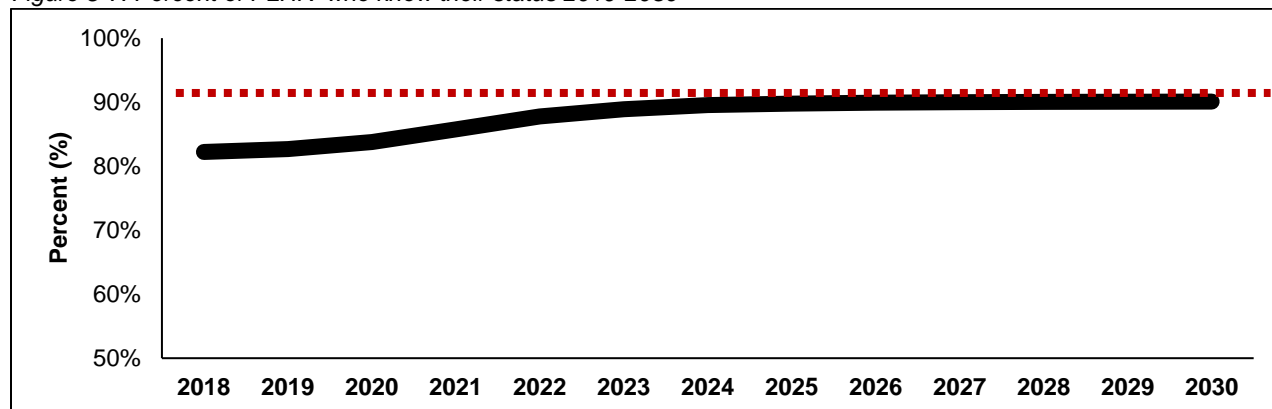
Costs of testing scale-up

Currently expenditure on HTC is about USD 40-50 M annually. The proposed HTC strategy could be implemented for less than USD 40 M annually. From today to 2020, HTC annual costs under the proposed strategy would increase from about USD 35 M, peaking at about USD 40 M in 2020. After, costs would plateau at about USD 35 M annually. Annual investments at about USD 35 would have to be maintained to keep the first 90 target high as new infections continue to occur.

Given that the costs of this strategy are less than current spending on testing and counseling, its implementation would be consistent with other efforts to maximize efficiency of the responses—for the same or less money being spent today. Targeted testing is particularly important given the bottleneck it represents to achieving 90-90-90 and the current shortfalls in national goals.

Figure 5-8. Costs of HTC scale-up to 90-90-90
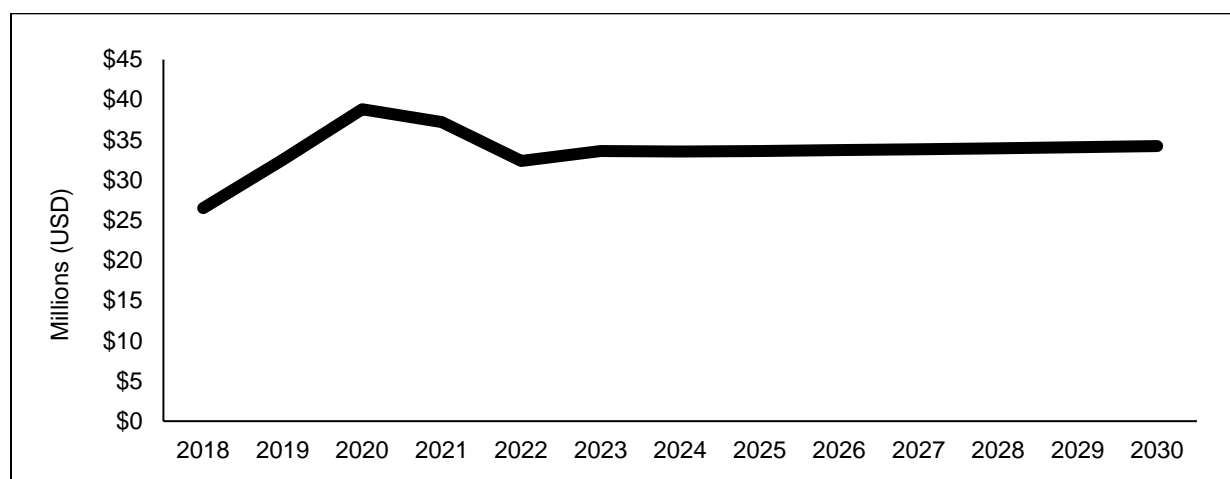
Optimization of Constant Coverage funding

Modeling assumptions

Figure 5-9. modeling assumptions for Optimization-Constant Coverage Funds Scenario

Abbreviation	O-CCF	
Coverage or budget driven?	Funding-driven	
Coverage target	Maximized after accounting for savings from Optimization; Reaches 90% ART coverage for adult PLHIV (15 +) by 2030	
Funding constraint	2019 funding constant	USD 456 M
	2030 funding constraint	USD 463 M*
	Cumulative funding constraint (2019-2030)	USD 5.5 B
	*Note: Given population growth, the absolute number of PLHIV on treatment in the Constant Coverage scenario increases by about USD 40 M from 2019 to 2030. However, the same increase in the O-CCF scenario is not realized because the savings in efficiencies offset the additional costs to not only maintain constant ART coverage but reach 90% ART coverage.	
Optimization	Optimization (prioritization of prevention interventions, ART technical efficiencies, and efficient testing strategy) applied at scale as described in previous section	

The effects of prioritization, technical efficiency, and targeted testing are shown together. The prioritization exercise was conducted following technical efficiency savings were applied to ART program to allow for maximum budget for prevention interventions. Cost savings from targeted testing are shown in each scenario.

Disease impact of Optimization at Scale

ART coverage. Through the additional funds freed up by the technical efficiencies and prioritization of treatment and the most cost-effective prevention interventions, the same funds from the Constant Coverage scenario could be stretched to put 250,000 more people on ART by 2030. As shown in *Figure 5-10*, O-CCF would enable the same treatment levels as set out in the NS, but at a much lower cost at USD 219 M vs USD 281 M in 2030 for 1.3 M PLHIV under ART.

Figure 5-10. Number on ART 2019-2030
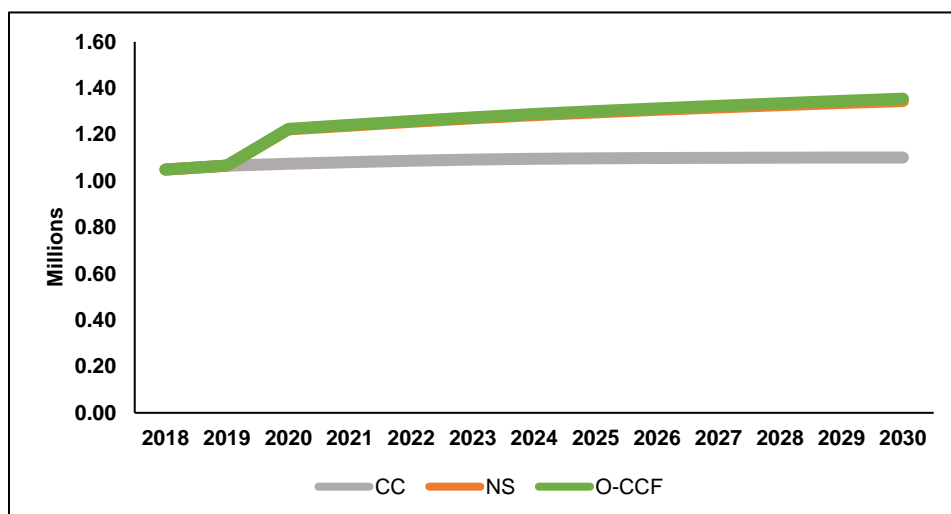
New infections. O-CCF would also have a major impact in averting more infections. Over 240,000 new infections would be prevented by O-CCF compared to Constant Coverage. From 2019 to 2030, annual new infections would drop by 70% and by 2030 new infections would be under 16,000 annually. A reduction of 84% from 2010 to 2030 would be realized, reaching close to but falling just short of the Fast Track goals. However, as discussed below, the O-CCF scenario costs only 69% as much as the NS.

Figure 5-11. New infections 2019-2030
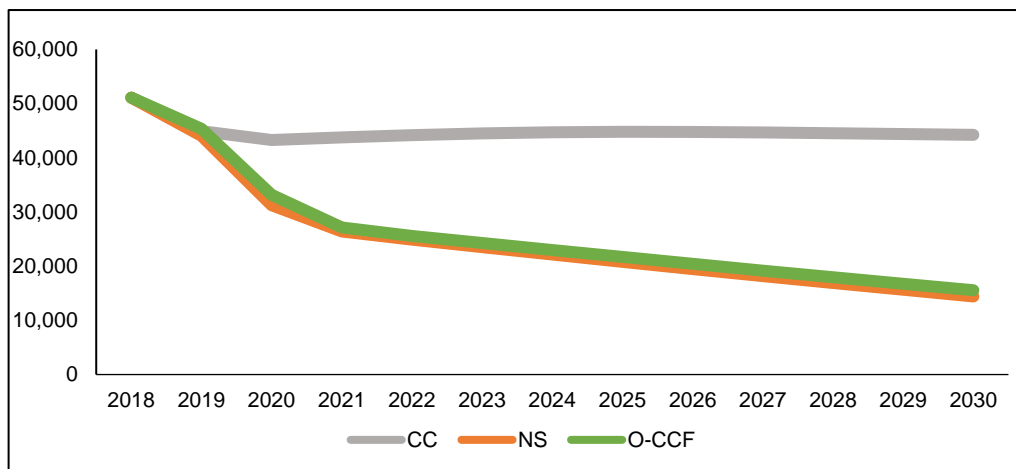
AIDS-related mortality. Optimization of Constant Coverage Funds would have the same impact on AIDS deaths as the National Strategy. About 190,000 deaths would be averted from 2019-2030 and a 56% reduction in annual deaths from 2019 to 2030 would occur. Optimization would get Tanzania close to Fast Track goals of 90% reduction, falling just short at 83%.

Life expectancy. Optimization of Constant Coverage Funds would also achieve similar effects on life expectancy as the National Strategy—one year longer than the CC scenario. In 2025, life expectancy would be 68.52 years under O-CCF and 69.83 years in 2030.

Cost-effectiveness of Optimization

Under O-CCF, impacts similar to those of the National Strategy could be achieved at just 67% of the total costs of the NS. In the later years when the NS costs continue to grow, O-CCF looks even more attractive. In 2030, O-CCF would requiring a resource envelope of USD 463 M annually compared to USD 839 M under the NS, a reduction of 45% (*Figure 5-12*).

Figure 5-12. Resource needs of O-CCF compared to CC and NS 2019-2030
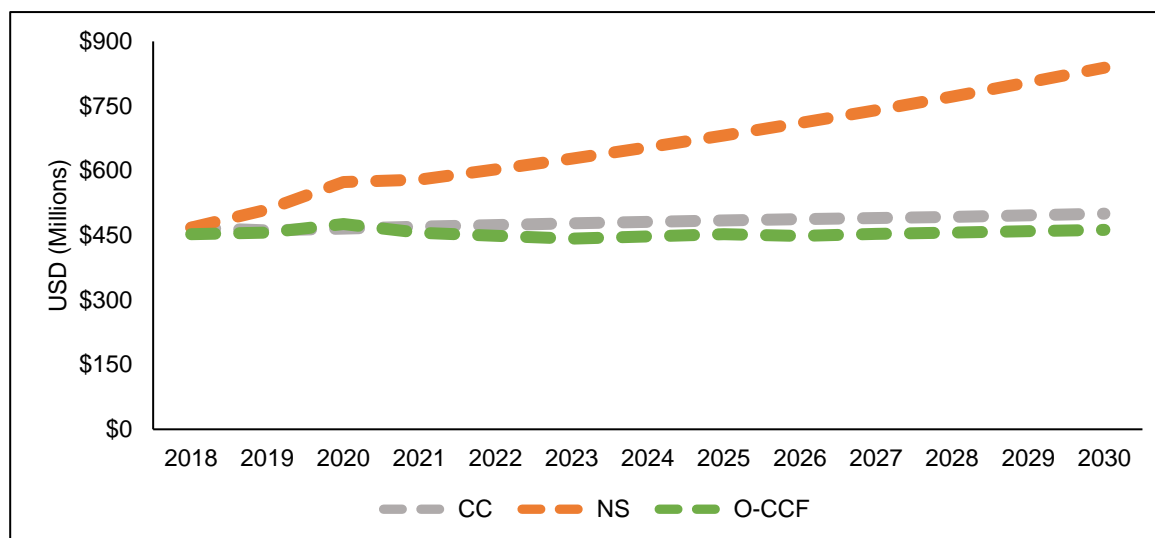
Compared to the Constant Coverage Scenario, O-CCF would achieve significantly more impact, but for even less money. In cost-effectiveness terms, the O-CCF scenario dominates the Constant Coverage scenario as cost-saving with higher impact, as shown in *Figure 5-13*. If the Optimization approaches are feasible, this assessment would suggest that the O-CCF scenario should be adopted over the CC.

Figure 5-13. Cost-effectiveness of Optimization-Constant Coverage Funding vs Constant Coverage

	Total cost 2019-2030 (USD M)	Incremental cost (USD M)	Infections 2019-2030	Additional infections averted	ICER (USD per additional infection averted)
CC	5,783	--	533,000	--	--
O-CCF	5,461	-322	290,000	243,000	-881

Compared to the National Strategy, the O-CCF also appears to be a cost-effective choice for a resource constrained environment. The NS does avert slightly more infections (12,000) than O-CCF, but at a much higher price tag. The cost to avert each of these additional infections under the NS would be USD 219,667.

Figure 5-14. Cost-effectiveness of Optimization-Constant Coverage Funding vs National Strategy

	Total cost 2019-2030 (USD M)	Incremental cost (USD M)	Infections averted 2019-2030	Additional infections averted	ICER (USD per additional infection averted)
O-CCF	5,461	--	243,000	--	--
NS	8,097	2,636	255,000	12,000	219,667

Key Takeaways of Optimization

Optimization of Constant Coverage Funds would achieve the same large impacts of the National Strategy Scenario but at a much lower cost, with funding levels similar to the Constant Coverage Scenario.

Figure 5-15. Impact of CC, NS, and O-CCF scenarios

	CC	NS	O-CCF
New infections (All adults)			
Cumulative new infections 2019-2030	533,000	278,000	290,000
Number of new infections in 2030	44,000	14,000	16,000
Percent change 2019-2030	-2%	-72%	-70%
Fast Track target (Percent reduction 2010-2030)	-55%	-85%	-84%
New infections (Adolescents)			
Cumulative new infections 2019-2030	150,000	74,800	79,000
Number of new infections in 2030	13,000	4,000	4,000
Percent change 2019-2030	+9%	-67%	-66%
AIDS-related deaths			
Cumulative deaths 2019-2030	408,000	220,000	220,000
Number of new infections in 2030	39,000	14,000	14,000
Percent change 2019-2030	+36%	-56%	-56%
Fast Track target (Percent reduction 2010-2030)	-53%	-83%	-83%
Number on ART			
Number on ART in 2030	1.10 Million (68% of PLHIV)	1.34 Million (87% of PLHIV)	1.35 Million (87% of PLHIVV)
Resources (USD M)			
Cumulative resources 2019-2030	5,783	8,097	5,461
Resources required in 2030	500	839	463

- Given the high price tag of the National Strategy, the O-CCF scenario, in which Constant Coverage funding levels are more efficiently spent, offers an alternative to achieving the same impact of the NS at a much lower and potentially more affordable cost, and with higher cost-effectiveness
- Technical efficiencies assumed in O-CCF (related to lowering the cost of treatment) are gaining political traction at present and thus may be feasible for Tanzania to scale. Allocative efficiencies via geographic targeting are also already under way, too. Shifts in the mix of spending on prevention to the most cost-effective interventions would stretch the scarce prevention funds further in pursuit of Tanzania's outcome targets, but the political feasibilities of phasing down in certain areas such as behavior change communication while scaling up other prevention services such as VMMC and condom promotion is unclear. We also have little information on the role that BCC interventions may play in increasing acceptance of prevention interventions so that high prevention coverage may be achieved.
- Using the approach dictated by Optimization, some important interventions, such as cash transfers would not be prioritized based on cost-effectiveness. But there may be other reasons to invest in these interventions, as discussed in Chapter 8, since these programs may generate social and economic benefits that go beyond HIV control.

CHAPTER 6: ADDRESSING POTENTIAL DECLINES IN DONOR FUNDING

In the previous chapter, modeling shows that Tanzania could make significant progress and come close to achieving its Fast Track targets using a funding envelope similar to the one available today -- but only if the country adopts a wide array of measures to improve allocative and technical efficiencies, and assuming that total available funding remains at around USD 450-500 M a year. But there are signals brewing that donor financing could fall in the coming years, from both PEPFAR and the Global Fund. If the Government fails to pick up the slack, what impact would this have on the national HIV response? In this chapter we explore such a possibility, assuming that donor funding decreases and there is no increase in domestic financing. Even if the remaining resources are optimized, what can Tanzania achieve? How much will the national program risk falling short of the NS/Fast Track goals?

Context: Anticipated declines

As described in Chapter 2, historically the HIV response has depended largely on external financing. The government funds less than 10% of the program.

The status of funding from the two major donors is largely determined by the Country Operational Planning (COP) process for PEPFAR and the current GF grant to the Ministry of Finance (MOF).

PEPFAR

Although the COP 2019 had not been finalized at the time of writing the IC 2.0, the January 2019 planning letter provides an initial envelope of total new funding with earmarks for specific priority areas. Total new funding amounted to USD 277.3 M, a reduction in funding of USD 116.4 M (30%) when compared to new funding in COP 2018. When accounting for the applied pipeline, the reduction from COP 2018 levels would be 23% (USD 324 M). Looking at the allocation of PEPFAR funds, the most significant decline is in treatment care and support and in orphans and vulnerable children. The planning letter highlights numerous conditions and areas of concern which have resulted in reduced funding and calls for them to be addressed urgently. These include "gaps in case-finding, linkage to and retention in HIV medical treatment, tuberculosis screening and treatment in PLHIV, transitioning to fixed-dose combination dolutegravir, and viral load monitoring and suppression rates." The planning letter states that several national policies act as barriers to health services for key populations and may lead to increased stigma and discrimination.

Figure 6-1. Comparison of PEPFAR funding levels for COP 2018 and COP 2019
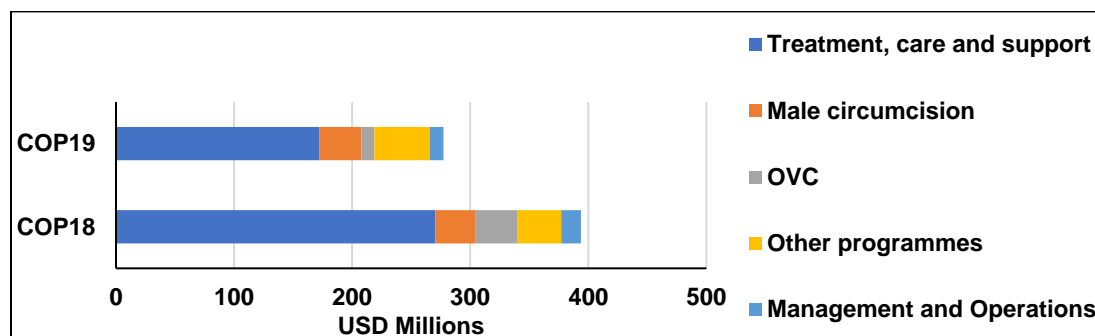
Even though the fresh PEPFAR allocation for Tanzania has been cut dramatically, total available funding for FY20 would also include pipeline funding that could soften this reduction. The pipeline includes

bridging finance at the end of the year which is typically estimated at 3 months of budget. For 2019-20, this would be USD 70 M (based on USD 277 M budget for the year). The reduction of pipeline is the released cash – so about USD 47 M, or 2 months of funding- which takes funding for FY 20 to a most likely USD 324 M (USD 277 M plus USD 47 M).

This additional USD 47 M means that Tanzania may not experience as serious of a crunch during FY20, but if the pipeline is exhausted and further cuts in new funding envelopes occur, especially if the USG's concerns expressed in the planning letter are not resolved (PEFPAR 2019b), the prospects for PEPFAR funding for beyond 2020 could entail further reductions that push allocations below the USD 300 M a year level.

Global Fund

Current levels of Global Fund funding are determined by the grant agreements signed with the two principal recipients (PRs) in Tanzania, MOF and AMREF. The current Global Fund grant (2018-2020) will still apply through 2020. The total grant amounts to USD 367.6 M for HIV interventions and has been allocated almost evenly over the three years (2018-2020) which implies approximately USD 120 M per annum over the grant period.

Global Fund has no concrete guidance for what will happen to the available funding in Tanzania moving forward, including for the next grant cycle 2021-2023, but consultations revealed that it is unlikely that Global Fund funding will increase and declines are possible.

Modeling Assumptions

The Declining Donor Funding scenario (O-DDF) aims to model the impact on the national HIV response of declining donor funds, assuming no other additional (domestic or external) financing would be available.

Since neither PEPFAR or Global Fund could project with certainty the magnitude of anticipated declines, it was assumed that PEPFAR funding would continue to fall 15% every 3 years following the already announced FY19 cuts, and that Global Fund would decline by 10% every 3 years in line with the GF replenishment cycles. These assumptions were set as a modeling exercise and have not been endorsed by either donor, but both donors have indicated that Tanzania should be prepared for a reduction in donor investment over time.

The O-DDF Scenario assumes optimization would be implemented to the reduced funding envelope, thus estimating the upper boundary of what could be achieved with the limited remaining resources.

Figure 6-2 Modeling Assumptions for Optimization- Declining Donor Funding Scenario

Abbreviation	O-DDF	
Coverage or budget driven?	Funding-constraint	
Coverage target	Maximized after accounting for savings from Optimization; Reaches 68% of adult PLHIV (15 years +) on ART in 2030	
Funding constraint	*PEPFAR*	23% decline 2020 15% decline every 3 years after
	Global Fund	10% decline every 3 years starting 2021
	Domestic	Constant (USD 55 M annually)
	2019 funding level	USD 456 M
	2030 funding level	USD 324 M

	Cumulative funding constraint (2019-2030)	USD 4.5 B
Efficiencies	ART technical efficiencies and efficient testing strategy applied at scale. Prevention intervention prioritization re-evaluated for available funding envelope	

Projected available resources

When these financing assumptions are applied, the outlook is worrisome. From 2019 to 2030, total resources would decline to USD 324 M, a decline of USD 152 M compared to 2019 levels. The cumulative reduction in donor funds would be about USD 1.2 B over the 11-year period, as compared to the Constant Coverage scenario.

Figure 6-3. Available resources 2019-2030
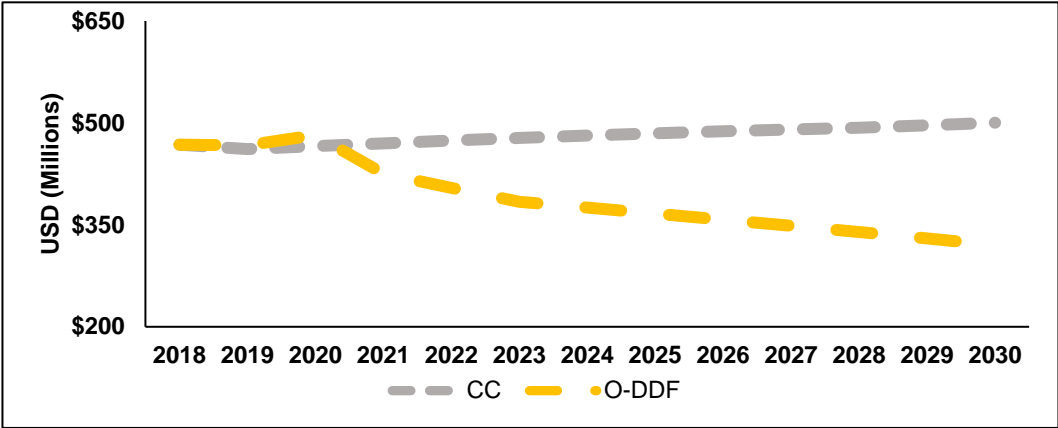
Disease impact of declining donor funds

Number on ART. Reduced donor funding would mean cuts across the board for all interventions, even if remaining funds are optimized. These cuts would have a significant impact on ART coverage (the share of PLHIV on ART) as well as the absolute number of people on ART. The number on ART would increase through 2020, but then it would begin to fall due to population growth and also reduced prevention efforts. In 2030, the number on ART is estimated at about 1.07 million (68% of adult PLHIV 15 years and older), 300,000 less than in the CC Scenario. Optimization of the available funds cushions the effects from being
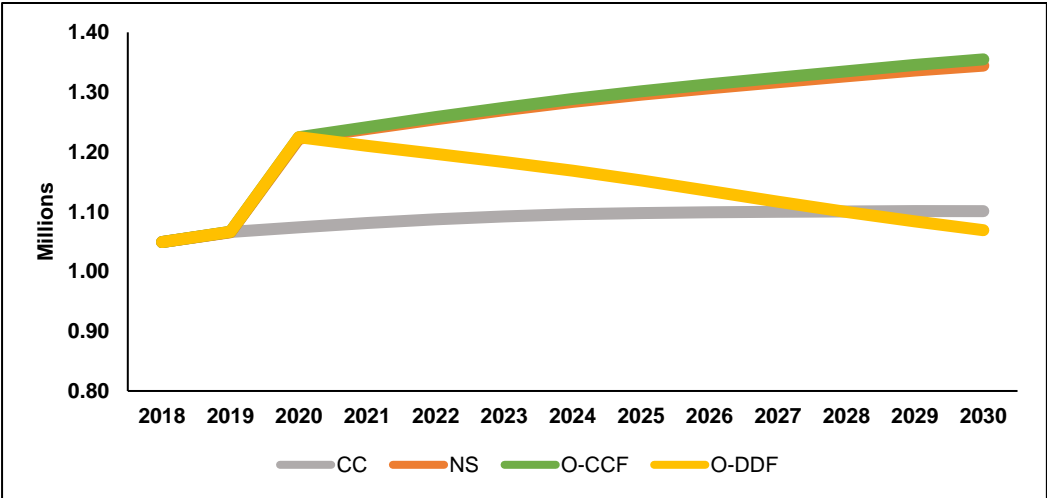
even larger; The number on ART under the O-DDF scenario only falls below the number on ART under the CC starting in 2028, even though significantly less funding is available, due to the effects of Optimization. If Optimization is not achieved, the numbers on treatment would be substantially lower.

Figure 6-4. Number on ART 2019-2030

New infections. The decline in donor funds without any countervailing increase in national financing has severe repercussions on new infections. Since ethically, available funds must first be used to prevent interruption of treatment for those currently on ART, under O-DDF very little funding would remain for prevention -- only USD 46 M in 2030 compared to USD 136 M under CC. As a result, after 2021, new infections would start to rise. From 2019 to 2030, annual new infections would increase by 7% as compared to the CC Scenario, reaching 55,000 new infections in 2030, a reversal of the gains that have been made to date. Progress towards the Fast Track target (2010-2030) would only be 44% of what Tanzania is seeking to achieve. New infections among adolescents would follow a similar trend, with infections in 2030 greater than they are today at 18,000 annually.

Figure 6-5. New infections 2019-2030
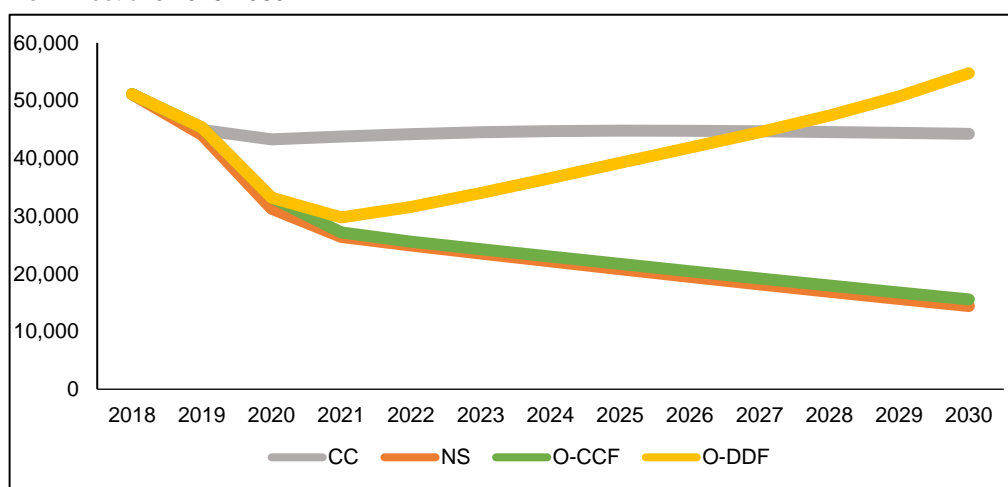
AIDS-related mortality. With declining donor funds, progress in reducing AIDS deaths would also falter. Prioritization of treatment over prevention would prevent deaths from rising in the early years but as the number of infected grew, AIDS deaths would start to increase in 2022, undoing past achievements more quickly than would be seen under CC. By 2030, the number of annual AIDS deaths (39,000) would be 24% higher than the number in 2019 (28,000).

Figure 6-6. AIDS-related deaths 2019-2030
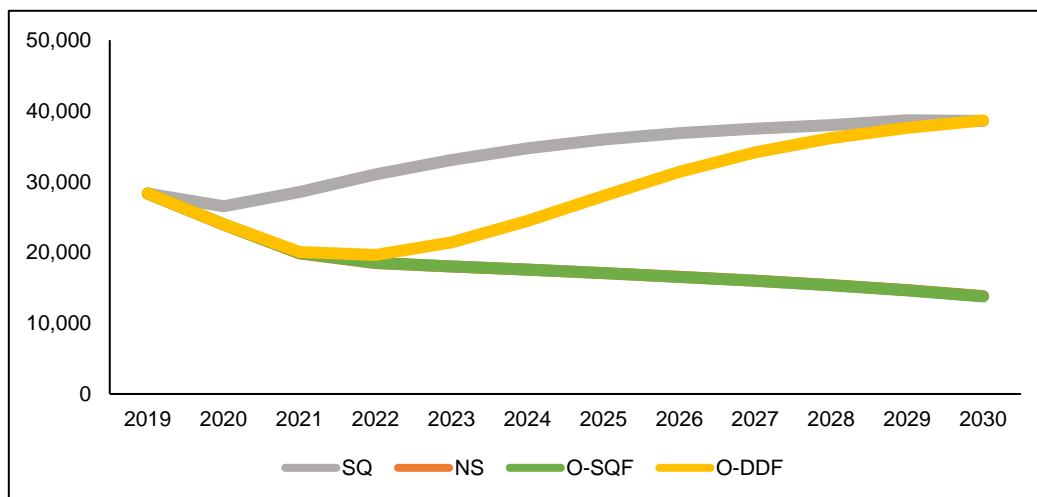
Life expectancy. A rise in AIDS-mortality would result in shortened life expectancy on average for Tanzanians, then what would be realized under the NS and O-CCF. Under O-DDF, life expectancy would be more similar to CC—at 68.03 years in 2025 and 68.83 years in 2030. Lower life expectancy is evidence that a decline in available resources for HIV services would ultimately have impacts on society beyond HIV-specific outcomes. Tanzanians would live for one year less on average, meaning less productivity for society and communities, in addition to less time spent with families and friends.

Takeaways on declining donor funds

As the results of the O-DDF scenario show, even gradually declining donor funding from PEPFAR and the Global Fund over the coming decade -- with no other external or domestic funding source stepping into the breach -- would lead to large negative impacts on Tanzania's HIV response. And this assumes that the sharply reduced funding available – 21% less over the next 12 years to 2030, and 35% less in the year 2030, as compared to the Constant Coverage Scenario – is optimized. Even with optimization, new infections and AIDS deaths would increase and numbers on ART would fall. If Tanzania failed to optimize the use of these shrinking funds, the negative effects on PLHIV would be even more acute. This is certainly not a desirable scenario from the public health perspective, yet it could materialize if the heavy donor funding for HIV in Tanzania continues to decline, and if the Government does not make up for the shortfall.

Figure 6-7. Comparing CC, NS, O-CCF, and O-DDF scenarios

	CC	NS	O-CCF	O-DDF
New infections (All adults)				
Cumulative new infections 2019-2030	533,000	278,000	290,000	489,000
Number of new infections in 2030	44,000	14,000	16,000	55,000
Percent change 2019-2030	-2%	-72%	-70%	+7%
Fast Track target (Percent reduction 2010-2030)	-55%	-85%	-84%	-44%
New infections (Adolescents)				
Cumulative new infections 2019-2030	150,000	75,000	79,000	149,000
Number of new infections in 2030	13,000	4,000	4,000	18,000
Percent change 2019-2030	+9%	-67%	-66%	+47%
AIDS-related deaths				
Cumulative deaths 2019-2030	408,000	220,000	220,000	344,000
Number of deaths in 2030	39,000	14,000	14,000	39,000
Percent change 2019-2030	+36%	-56%	-56%	+24%
Fast Track target (Percent reduction 2010-2030)	-53%	-83%	-83%	-52%
Number on ART				
Number on ART in 2030	1.10 Million (68% of PLHIV)	1.34 Million (87% of PLHIV)	1.35 Million (87% of PLHIVV)	1.07 Million (65% of PLHIV)
Resources (USD M)				
Cumulative resources 2019-2030	5,783	8,097	5,461	4,544
Resources required in 2030	500	839	463	324

CHAPTER 7: DOMESTIC RESOURCE MOBILIZATION

With the potential for declining donor resources to jeopardize Tanzania's HIV response, as described in the previous chapter, the government's ability to mobilize increased domestic funding for HIV would become critical to safeguard past progress and enable the country to advance toward its longer-term goals. This chapter explores a scenario – Optimization with Domestic Resource Mobilization (O-DRM), in which Tanzania expands domestic funding of the response, in line with its ability to pay. It attempts to answer the questions "how much additional funding can the country mobilize from various sources?" and "with these extra resources, and with optimization of their use, to what extent could Tanzania overcome the negative effects of declining donor funding and move toward its Fast Track goals?"

Historical context of domestic financing (for HIV) in Tanzania

As described above in Chapter 6, financing of the health sector as a whole and the HIV response in particular has been heavily dependent on support from development partners. In 2017, the estimated domestic contribution was USD 52.3 Million, less than 10% of total expenditure (Global Fund 2018a). The annual domestic contribution increased from USD 36.8 M in fiscal year 2014-2015 to USD 52.3 M in 2016-2017, a 42% rise over the three-year period. Looking further back, domestic funding of USD 138.8 M from 2014-2017 was 76% higher than the USD 78.7 M spent over the same corresponding three years from 2011-2014. These figures include government financing of human resources in health (salaries of government health workers), essentially fixed costs which would be paid regardless of how much time these workers spent caring for HIV and AIDS. The amounts spent on drugs, tests, and other commodities, and on procurement services, labs, information systems, and other inputs to the HIV program appear to be small. Given that the most domestic resources go to human resources and not commodities, it is possible the noted increase in domestic contributions could be due in improvements in the government's methodology for how financial data is collected and how staff time is allocated.

In addition to these concerns, budget execution rate within the MOH and the HIV response generally is relatively low. In 2015/16 budget execution was 61% for the total health budget and picked up to 77% in 2016/17 (MoHCDGEC 2018a). Low budget performance was explained by late disbursement of funds, non-release of public and non-basket funds and delays in signing agreements under the new health facility financing mechanism (direct health facility financing). For HIV funding specifically, examples of under-spending include the fact that expenditures by the Medical Stores Department was only 20% of the FY 2016/2017 planned allocation (UNICEF and MoHCDGEC 2018). Late and unpredictable release of government budget funds severely affect implementation in an environment of declining external funding and increased reliance on domestic funding.

Future domestic public funding of the HIV response: What is feasible?

Given the history of limited public funding for HIV in Tanzania and the potential gap created by declining donor funds the mobilization of domestic resources for the HIV response becomes critical. It is unlikely that domestic funding will replace external funding dollar for dollar immediately, but gradual increases may have to occur over time to safeguard the national response.

In order to estimate the amount of domestic funding which could realistically be committed to HIV, analysis of fiscal space was conducted based on assumptions about future gross domestic product, public health spending and the allocation of government health budgets to HIV. These are summarized in *Figure 7-1* below. In arriving at targets for an achievable allocation of domestic public expenditure to

health and HIV, we considered the performance of neighboring countries and the recently published health expenditure 'scorecard' for African Union member countries (African Union and Global Fund 2018).

In summary, the relevant targets provide for:
- Domestic General Government Health Expenditure (GGHE-D) as % General Government Expenditure (GGE) which is assumed to rise from 7% at present to reach 11% by 2020, based on the Abuja declaration targets
- Domestic expenditure on HIV as a share of government health expenditure, which is assumed to increase from the current level (5.7% in 2017) to 7% of domestic government health expenditure by 2030. By comparison, domestic spending on HIV as a share of health budgets exceeds 10% in both Uganda and Kenya (IMF, WEO)

Figure 7-1. Summary of assumptions underpinning projections of feasible domestic resource mobilization

Key indicator	Baseline	Target	Future assumption
Gross domestic product	7% growth in 2016, increasing to 7.3% in 2020 (Trading Economics 2019)	--	From 2020, GDP growth slows by 0.25% per annum to 4.8% in 2030
General government total expenditure as a % of GDP (GGE)	17.3% in 2017 and increases to 18.9% by 2023 (IMF 2018)	--	From 2023; GGE remains at 18.9% of GDP for the duration of the forecast
Domestic General Government Health Expenditure (GGHE-D) as % General Government Expenditure (GGE)	7% in 2015 increasing to 10% in 2016 (IMF 2018)	11% Regional target is 15% but reaching 15% seem unlikely given competing development needs	Increases by 0.25% per annum and reaches a ceiling of 11% in 2020 and remains at that level
Domestic General Government Health Expenditure (GGHE-D) on HIV as % of GGHE-D	6.2% in 2015 (Global Fund 2015) Declining to 4.4% in 2019	7% Neighboring counties achieved over 10%, but 10% was assessed to put too much pressure on the government budget	Increases by 0.25% until a ceiling of 7.2% is reached in 2030

Using the baseline data and assumptions as described above, the total domestic contribution to HIV could be expected to increase from the baseline values of USD 37 M and USD 50 M in 2015 and 2016 to an annual total of USD 174 Million in 2030. This trend suggests an annual increment of USD 6-14 Million per annum, the latter increase achieved in the final year of the forecast period. This estimated increase was based on the best data available and validated by stakeholders -- preliminary estimates of USD 10 M in annual increments to public spending were presented to the Technical Working Group in February 2019 and the final estimates were reviewed by NACP and TACAIDS in April 2019. The full calculations are available in Annex 9.

Figure 7-2. Estimated feasible amounts of domestic funding for HIV to 2030 (USD Millions)
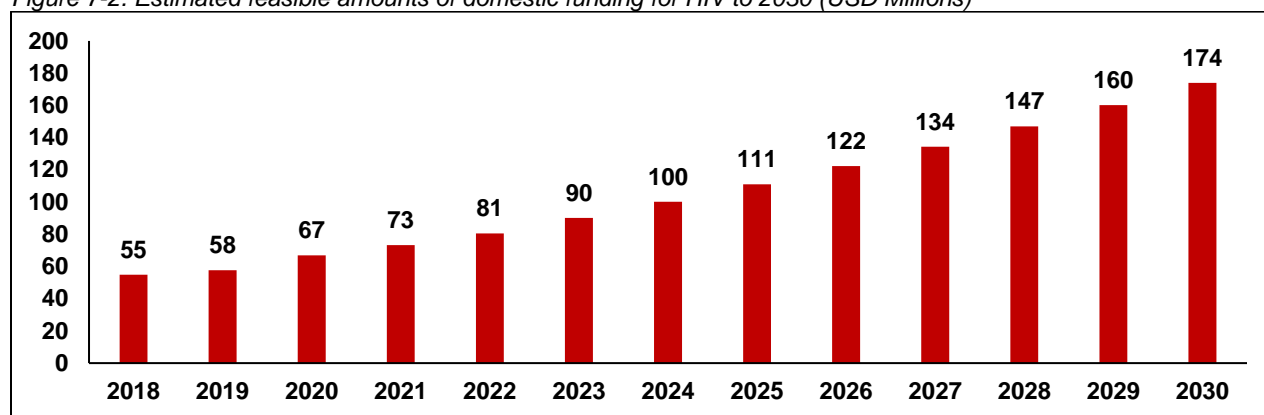
Modeling Assumptions

The scenario for Optimization with Domestic Resource Mobilization (O-DRM) aims to model the impact on the national HIV response of additional domestic contributions in mitigating the impact of declining donor funds, assuming optimization to maximize the impact of the additional domestic funds as well as the reduced donor financing. Without optimization the benefits of the extra domestic spending on HIV would be much lower, preventing Tanzania from achieving its Fast Track goals.

Figure 7-3. Modeling assumptions for O-DRM scenario

Abbreviation	O-DRM	
Coverage or funding-driven?	Funding-driven	
Coverage target	Maximized after accounting for savings from Optimization; Reaches 90% ART coverage for adult PLHIV (15 +) by 2030	
Funding constraint	*PEPFAR*	23% decline in 2020 15% decline every 3 years after
	Global Fund	10% decline every 3 years starting 2021
	Domestic	Increases from 55 M annually by 3-14 M a year (see above), reaching USD 174 M in 2030
	2019 funding level	USD 453 M
	2030 funding level	USD 419 M
	Cumulative funding (2019-2030)	USD 5.2 B
Optimization	ART technical efficiencies and efficient testing strategy applied at scale. Prevention intervention prioritization re-evaluated for available funding envelope.	

Projected available resources

If domestic funding increases incrementally each year as projected above to USD 174 M in 2030, these additional resources could help offset the losses in donor funding, which are estimated at over USD 800 M over the next 12 years under this scenario as compared to the CC scenario. Cumulative resources under the O-DRM scenario would amount to 90% of the resources available under the Constant Coverage Scenario from 2019-2030. In 2030, total funding under O-DRM would be USD 419 Million compared to USD 500 Million under the CC Scenario and USD 324 M under the O-DDF scenario.

Figure 7-4. Available resources 2019-2030
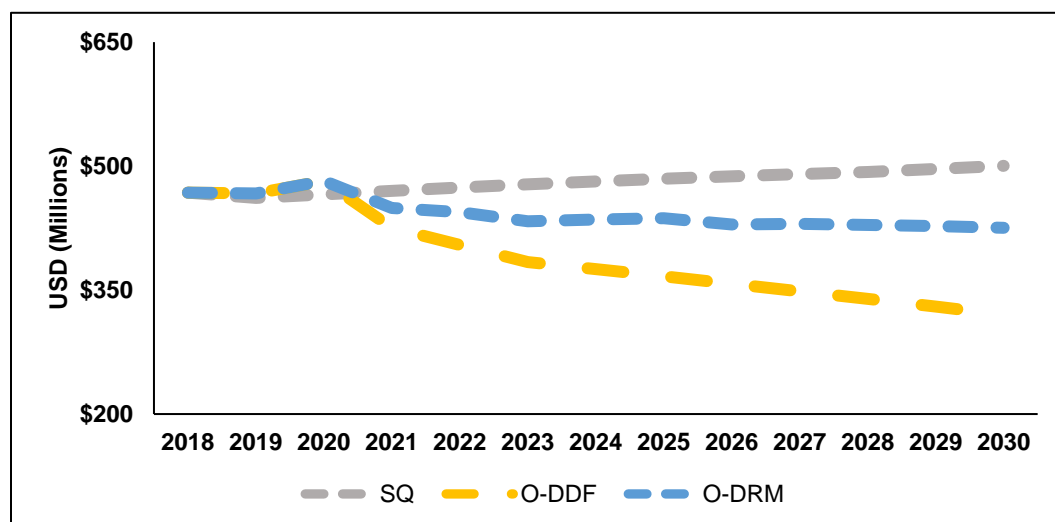
O-DRM would have important implications for long-term sustainability of the program and transitioning financial oversight from external donors to the Government. If domestic contributions were to increase according to these projections, the composition of the program financing would shift from less than 10% government funding to more than a third government funded, yet donor financing would still make up the majority of HIV spending in Tanzania.

Figure 7-5. Changes in funding contributions over time under O-DRM
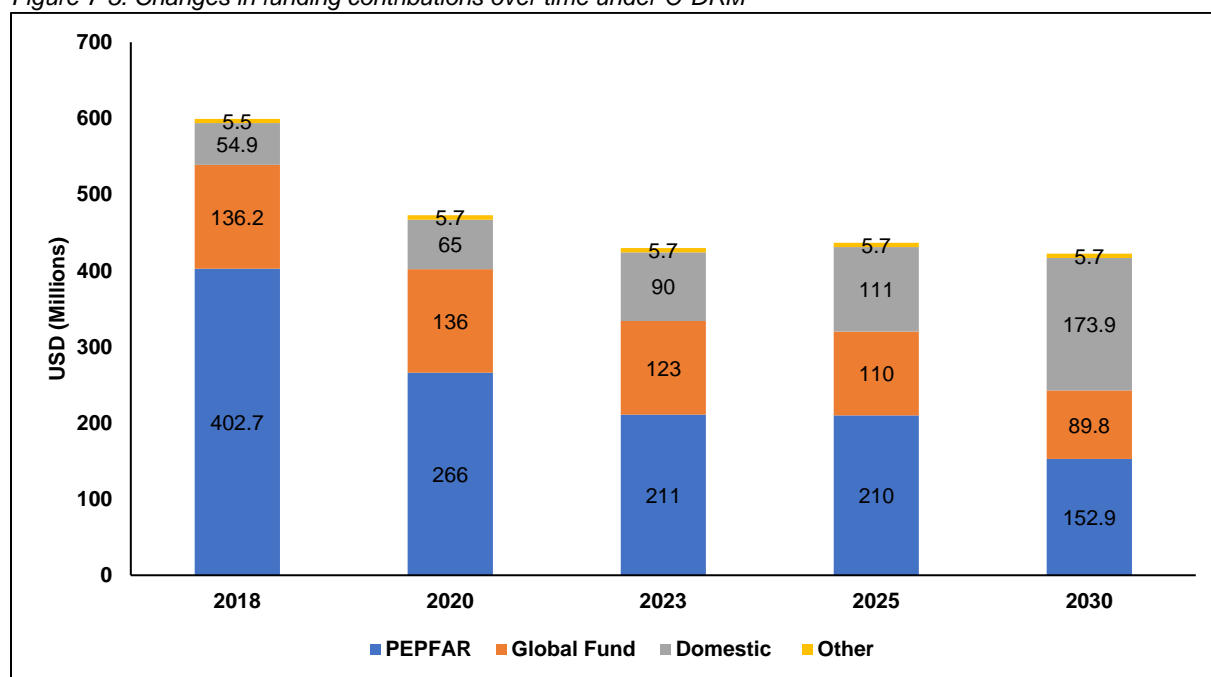
Estimated impact of the additional domestic contribution

ART coverage. Domestic resource mobilization would help achieve ART coverage goals of the National Strategy. Since optimization of available funds was assumed, ART coverage was prioritized. In 2030, 1.37 PLHIV would be on treatment.

Figure 7-6. Number on ART 2019-2030
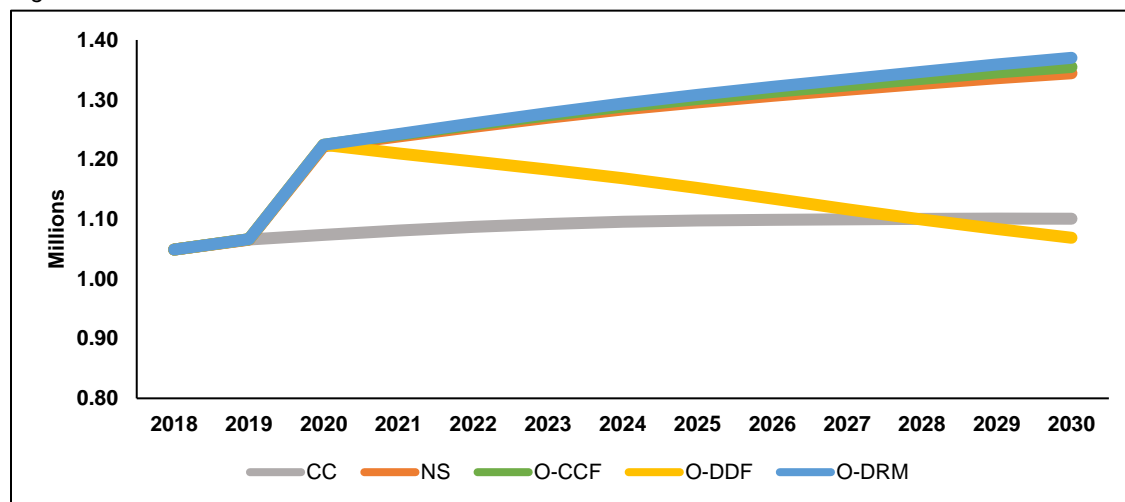
New infections. Domestic resource mobilization would lead to new infections declining substantially in line with national goals. New infections would decline by 66% from 2019-2030 compared to 70% in the O-CCF and 72% in the NS scenario. Over 180,000 new infections would be averted compared to the O-DDF scenario. From 2010-2030, a decline of 82% from the CC Scenario would be achieved, coming close to achieving the 90% Fast Track reduction.

Figure 7-7. New infections 2019-2030
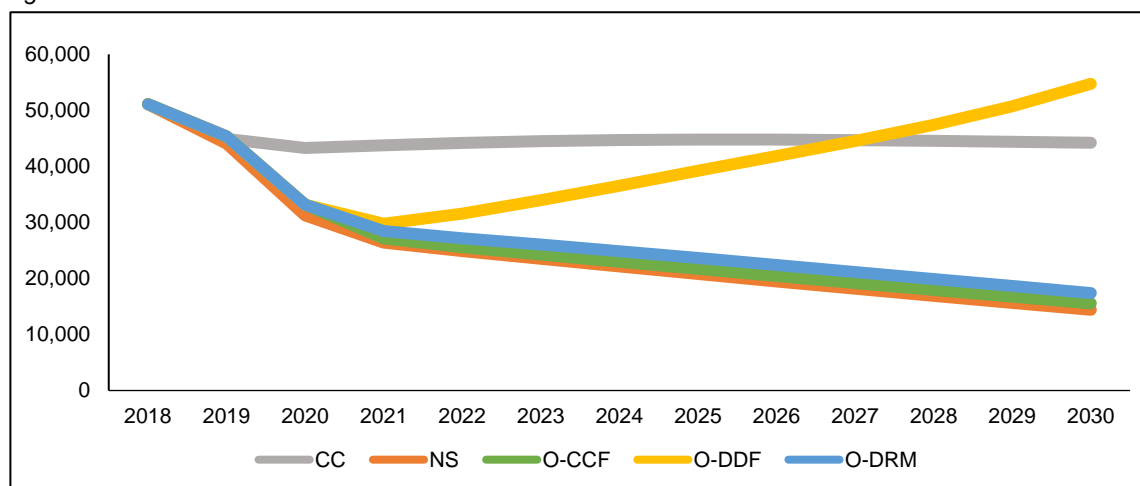
AIDS-related mortality. O-DRM would have similar positive impacts for AIDS deaths, achieving the same benefits of the NS and O-CCF scenarios with a 56% decline in annual deaths from 2019-2030. This similar impact is possible even though O-DRM has 12% less funding since the optimization approach prioritizes ART first. The Fast Track targets would almost be met with a 83% reduction from 2010-2030.

Figure 7-8. AIDS-related deaths 2019-2030
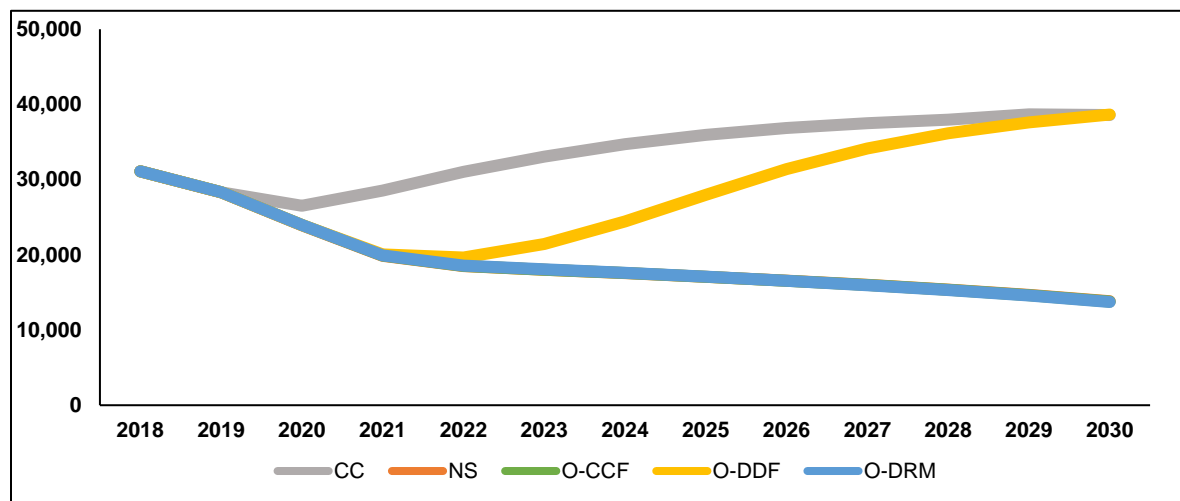
Life expectancy. Additional domestic resources would also restore the wider benefits HIV prevention and treatment have on society. Like the NS and O-CCF, O-DRM would result in a life expectancy on average one year longer than in the CC or O-DDF scenarios. In 2025, life expectancy under O-DRM would be 68.52 years and 69.84 years in 2030.

Key takeaways on domestic resource mobilization

Domestic resource mobilization could play a critical role in sustaining progress in a scenario in which donor funds continue to decline. Domestic resources could in substitute partially for the lost donor funds. With the boosted impact of optimization, impacts nearly as great as those under NS and O-CCF scenarios could potentially be achieved at a cost over the next decade around USD 2.5 B less than under NS and slightly less than under O-CCF.

Figure 7-9. Summary of all scenarios impacts and costs

	CC	NS	O-CCF	O-DDF	O-DRM
New infections (All adults)					
Cumulative new infections 2019-2030	533,000	278,000	290,000	489,000	308,000
Number of new infections in 2030	44,000	14,000	16,000	55,000	17,000
Percent change 2019-2030	-2%	-72%	-70%	+7%	-66%
Fast Track target (% Reduction 2010-2030)	-55%	-85%	-84%	-44%	-82%
New infections (Adolescents)					
Cumulative new infections 2019-2030	150,000	75,000	79,000	149,000	86,000
Number of new infections in 2030	13,000	3,000	4,100	18,000	5,000
Percent change 2019-2030	+9%	-67%	-66%	+47%	-60%
AIDS-related deaths					
Cumulative deaths 2019-2030	408,000	220,000	220,000	344,000	220,000
Number of deaths in 2030	39,000	14,000	14,000	39,000	14,000
% change 2019-2030	+36%	-56%	-56%	+24%	-56%
Fast Track target (Percent reduction 2010-2030)	-53%	-83%	-83%	-52%	-83%
Number on ART					
Number on ART in 2030	1.10 Million (68% of PLHIV)	1.34 Million (87% of PLHIV)	1.35 Million (87% of PLHIV)	1.07 Million (65% of PLHIV)	1.37 Million (87% of PLHIV)
Resources (USD M)					
Cumulative resources 2019-2030	5,783	8,097	5,461	4,544	5,182
Resources required in 2030	500	839	463	324	419

Macro-economic and financial benefits of increased investment in the HIV response

In 2018, a team of experts examined the broader economic returns of ending the AIDS epidemic as a public health threat and published the result in early 2019 (Lamontagne et al 2019). The team used two different approaches to estimate the incremental economic returns of investing in and achieving the UNAIDS Fast Track scenario when compared to a constant coverage scenario. The study included 28 low- and middle-income countries. The benefits were calculated using the full income approach and the productivity approach. Although results for Tanzania are not separated, East and Southern African region shows the second highest return on investment: an incremental cost benefit ratio of 6.46, implying that every additional dollar invested to achieve Fast Track targets would yield economic benefit of over six dollars. Using the O-DRM scenario above, additional domestic investment to reach Fast Track targets amounts to USD 660 M over the period to 2030 and would yield economic benefit of USD 4.3 B for Tanzania.

Potential mechanisms for implementing increased domestic funding for the HIV response

Given how important additional domestic resources will be in preventing new infections, saving lives, and ensuring the continued progress of the HIV response, especially in a declining donor scenario, identifying mechanisms for realizing domestic resource mobilization in Tanzania is critical. Below is an overview of

the most important domestic initiatives currently under way to mobilize additional resources for the HIV response and the health sector in general, on top of the more traditional approach to increasing the health ministry budget.

Many of these mechanisms emerge from broader health financing reforms which were first introduced in Tanzania in the late 1990a and include the establishment of the National Health Insurance Fund (NHIF) and the Community Health Fund (CHF). The concept of Universal Health Coverage (UHC) was introduced by the WHO in 2010 (Wang et al 2018) and in Tanzania provides an opportunity to improve equitable access to health services for all. UHC has provided further impetus to expand and increase the coverage of the NHIF and the CHF.

Although many innovative funding mechanisms have been proposed in national HIV and health financing strategies and related documents, this section will focus on those most likely to result in significantly increased HIV funding while arguing that many innovative financing mechanisms proposed in recent years have not borne fruit and may not help to mobilize the funds required to fill HIV financing gaps.

National Health Insurance Fund

The National Health Insurance Fund (NHIF) was established by an Act of Parliament (No 8) in 1999 as part of the broader suite of health reforms to provide health insurance coverage for families in formal employment.

Contributions comprise 6% of the employee's gross salary and are evenly split between the employer and the employee. Membership has increased over the years from 248,343 in 2005 to 850,268 in the 2017 fiscal year (MoHCDGEC 2018). The number of beneficiaries stands at 3.7 M, or about 6.5% of the population. Note from the table below (*Figure 7-10*) that the revenue received by the fund continues to exceed the total expenditures, generating surpluses that could potentially be used for HIV. However, the current NHIF benefits package does not include direct HIV services.

Figure 7-10. Summary of NHIF revenue and expenditure

	2013/14	2014/15	2015/16	2016/17
	USD mil	USD mil	USD mil	USD mil
Total revenue (USD 'millions)	161.24	190.36	206.67	219.46
Total expenditure	80.25	114.69	132.23	170.63
Under expenditure	80.99	75.67	74.44	48.83
Execution rate	49.8%	60.2%	64.0%	77.7%

The Health Policy brief on sustainable financing for HIV reports on research work which analyzes whether financing HIV services through national health insurance schemes is a viable option in Tanzania (Health Policy Plus 2018). The analysis examined the proportion of people living with HIV that could potentially be enrolled on ART and estimated the incremental costs to the NHIF for select HIV services to assess sustainability. Results show that the National Health Insurance Fund could almost immediately absorb USD 24 million in incremental costs for HIV services, covering 96,000 people living with HIV in year one within the scope of its existing pooled resource. This is a significant contribution and would more than meet the additional domestic contribution estimated in the O-DRM scenario above. As part of a longer-term sustainability strategy, it is important to continue to advocate for the gradual inclusion of HIV in the basic health benefit package.

Community Health Fund

The Community Health Fund was first introduced as on a pilot basis in 1996 and rolled out to other districts in 1998. The fund currently operates in 155 districts (Wang and Rosemberg 2018*).* It was introduced in response to the implementation of fees for services and cost sharing beyond the district hospitals to health centers and dispensaries. It provides an alternative for paying for health services and aims to reduce financial and health risk for the mainly rural and poor populations. In 2001, the CHF Act was established as an official policy to mobilize funds at district and community level. The funds, administered at district level by District Health Boards, are financed through user fees, household prepayments and a 1-to-1 matching grant from government. As such, the funds are highly dependent on the actual payment by government of the matching grant which in turn is funded substantially from the donor financed Health Basket Fund.

Household Contributions to the fund are voluntary and each local authority decides on contribution rates and the benefits package. Significant differences are therefore present when comparing districts with each other; there are no clear guidelines for the implementation of the scheme. The use of funds depends on requests submitted by facilities managers. For most facilities, the use of CHF funds comprises a very small percentage and based on the World Bank study, the average from a sample of facilities was 1.6% of total facility resource requirements. Although the fund may cover some costs for treating opportunistic infections and related ailments it is unlikely that the fund will evolve in the medium term to cover substantial portions of direct HIV expenditure through own revenue and matching funds.

AIDS Trust Fund

The AIDS Trust Fund was established by government as an additional funding mechanism to expand resources for HIV from the private sector, non-traditional external sources, and a range of innovative funding instruments (TACAIDS 2018). The fund has not been in operation for long, but some questions are already being posed about its ability to achieve the ambitious resource mobilization targets set during conception. In its original target setting, the ATF sought to increase the domestic contribution from 3% of total HIV expenditure to 30% by 2018 (Tanzania CCM 2017). In reality, revenues accruing to the AIDS Trust Fund have been much less, with a pledge from government in 2016/17 for USD 2.7 M of which only USD 470 000 had been disbursed by May 2017.

NMSF IV lists several possible funding mechanisms which could contribute revenue to the ATF and the HIV response. These include various levies and sin taxes. However, research indicates that earmarking revenue via sin taxes or cellphone airtime levies for a narrow expenditure purpose like HIV may not generate additive funds and could introduce rigidities into the budget (United Nations Economic Commission for Africa 2015; Results for Development 2017).

Other sources of DRM

Other funding sources proposed by NMSF IV include a variety of mechanisms which to date have not generated significant revenue for HIV in Tanzania. These include:

- Leveraging additional finances through HIV integration and mainstreaming in the public and private sectors with a focus on workplace wellness programs.

- Launching social impact bonds (SIB).[4] The establishment and operationalizing of SIBs is proving complex and transaction costs are high. For these reasons, few if any SIBs have made a significant contribution to HIV funding in any country around the world to date.
- Blended finance and other loan instruments which have long maturity horizons and flexible terms but provide the lender with the comfort of knowing that funds will be used for the HIV response as co-funding for partner program and will be closely monitoring by partner organizations. Countries in Africa are not currently borrowing through these instruments for HIV, and Ministry of Finance has thus far not shown interest in doing so for Tanzania.

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[4] In a SIB an investor (a donor or private sector organization) provides upfront financing to a service provider for implementing pre-determined interventions. If the desired outputs and outcomes are achieved, the investor is reimbursed by a paying organization which could be a donor or government.

CHAPTER 8. SCALING UP THE AGYW PACKAGE OF PREVENTION INTERVENTIONS

Two of the most concerning program challenges for Tanzania's HIV response are rising new infections among AGYW and poor testing coverage. In the Optimization exercises, a more efficient, targeted testing strategy that would meet the 90% of PLHIV who are aware of their status target was identified that would cost even slightly less than the current testing approach. This more efficient testing strategy was assumed to be readily scalable, even in the current uncertain financing context since no additional investments would be needed beyond currently available resource levels and it would even save resources that could be reallocated to other interventions.

However, in a resource-constrained environment, the pure pursuit of efficiency may result in some key challenges not being prioritized, such as scaling up an AGYW package of interventions. With the pressure of maintaining ART, and the large budget required to do this, and then the competing high cost-effectiveness of well-established HIV biomedical interventions like condoms and VMMC, new investments that are not shown to save money, like the testing strategy, may require consideration of factors outside the pure optimization lens.

For instance, from an equity and sustainability perspective, investing in AGYW is critical to the HIV response in Tanzania. AGYW are disproportionately vulnerable to new infections and given the multifactorial nature of the factors driving high incidence among AGYW, expensive structural interventions may be needed to substantially alter their risk profile. To ultimately achieve epidemic control, AGYW cannot be left behind.

 In this penultimate chapter, we present the results of a modeling sub-analyses that aims to look at the contributions that scaling up an AGYW package of interventions might make to Tanzania's HIV program and also possible solutions to financing it in a resource-constrained environment.

High incidence among AGYW

Adolescent girls and young women (AGYW) continue to face a disproportionate burden of HIV. Nationwide, incidence among AGYW is about 0.3% but varies significantly across councils as shown in *Figure 8-1*.

Since 2010, there has been a 9% increase in infections among adolescents 15-19 years and an alarming 56% increase among young adults 20-24 years (UNICEF 2018). In 2016, 40% of all new HIV infections were in young people, mostly among females (UNICEF 2018). This increase in new infections among this adolescents and young adults, particularly AGYW, is due to a complex web of largely social and economic factors, including cultural norms, poor education, low self-esteem, limited economic self-reliance, and gender-based violence (COP 2018).

Figure 8-1. Distribution of HIV incidence among AGYW across Tanzanian councils
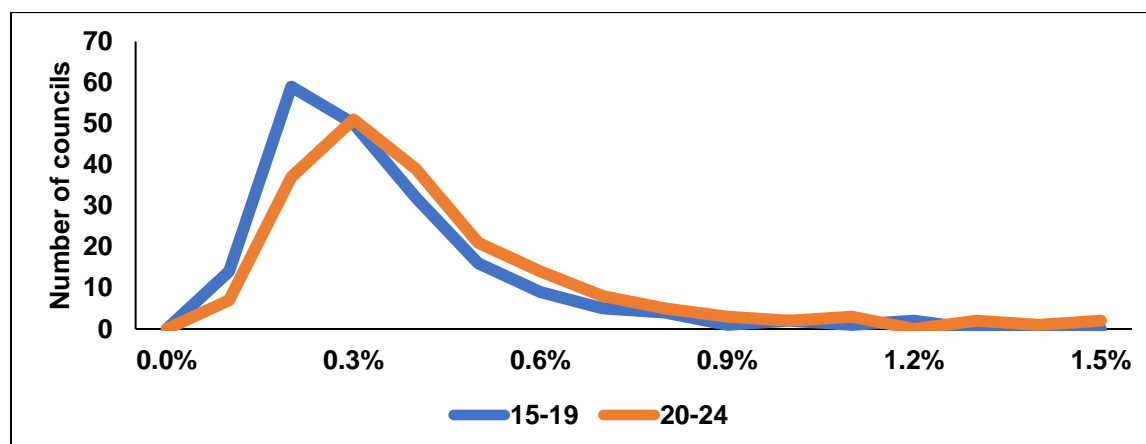
Comprehensive prevention approach to reducing incidence among AGYW

To reduce new infections among AGYW, a comprehensive package of structural, behavioral, and biomedical interventions is required. Some of the interventions that have been shown effective to reducing HIV risk among AGYW include condoms, VMMC for ABYM, education, cash transfers, and ART (Saul et al 2018).

These interventions have both direct HIV impacts (biomedical) and also indirect (non-HIV, but improving the enabling environment) impacts. These relationships are of these interventions summarized below:

Figure 8-2. Summary of direct and non-direct HIV impacts of AGYW interventions

AGYW intervention	Direct HIV impacts	Indirect HIV impacts
Condoms	Prevents HIV transmission between AGYW and partners	
VMMC	Reduces risk of HIV in sexual partners of AGYW	
Comprehensive sexuality education		Early pregnancy is associated with lower educational attainment and socioeconomic status, making AGYW more vulnerable to transactional sex, gender-based violence, and potentially HIV
PrEP	Prevents HIV acquisition in AGYW	
Post-violence care and Post-exposure prophylaxis	Reduces risk of HIV acquisition	
Social and economic empowerment		School subsidies that increase secondary school attendance are associated with lower HIV risk. Social and economic empowerment interventions improve overall female empowerment.
Caregiver education		Supports parents in discussing risks of HIV with AGYW and can increase the age of sexual debut and decrease exposure to gender-based violence
Social asset building		Social capital increases agency and female empowerment among AGYW

Source: Saul J, Bachman G, Allen S, Toiv NF, Cooney C, Beamon T (2018) The DREAMS core package of interventions: A comprehensive approach to preventing HIV among adolescent girls and young women. PLoS ONE 13(12): e0208167

Both external and government partners have recognized the need for addressing the unique HIV burden among AGYW. PEPFAR launched DREAMS in Tanzania in 2016 (PEPFAR DREAMS) as an initiative to deliver this type of comprehensive package to AGYW. Up to FY 2018, DREAMS was implemented in seven SNUs (Temeke, Kahama TC, Shinyanga MC, Ushetu, Msalala, Kyela, and Mbeya CC). To date, DREAMS has reached over 175,000 AGYW (COP 2018).

Preventing HIV is a priority among MoHCDGEC as well. Pillar 1 of the National Accelerated Action & Investment Agenda for Adolescent Health & Wellbeing is Preventing HIV through improving community-based HIV testing and linkages to prevention and care, increasing access to and uptake of protective measures, voluntary medical male circumcision (VMMC) and pre-exposure prophylaxis (PrEP) (MoHCDGEC 2018b).

Need for to scale-up AGYW interventions

Under the CC scenario, 150,167 new infections would occur among AGYW and ABYM between 2019-2030. The NS scenario would avert 50% of these new infections. The O-CCF and O-DRM scenarios would also lower new infections similarly, while Optimization with Declining Donor Financing (O-DDF) would lead to a sharp rise in new AGYW infections as in the CC scenario (*Figure 8-3*).

Figure 8-3. New infections among 15-24 years 2019-2030
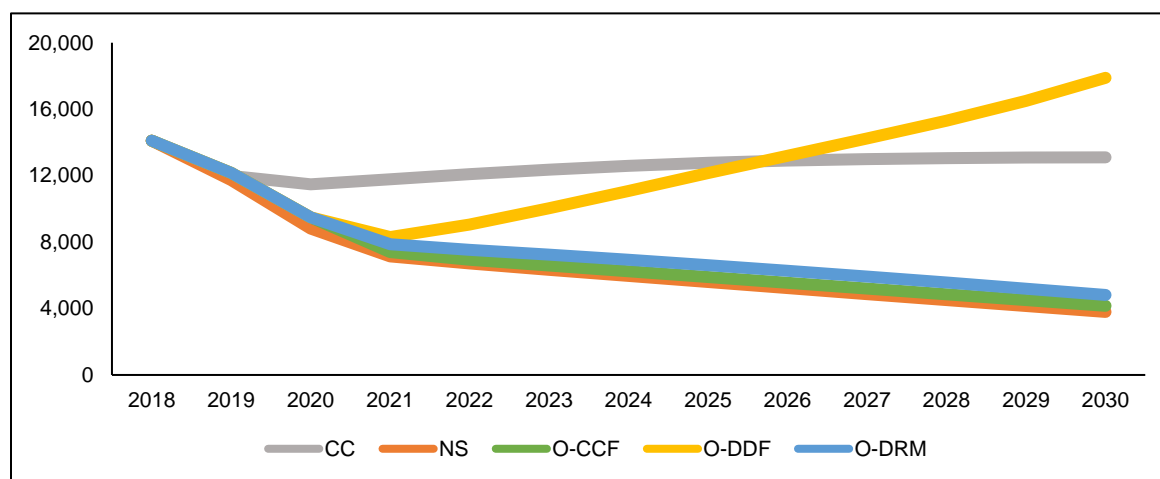
Although the O-CCF and O-DRM would achieve significant reductions in new infections among adolescents and young adults, important interventions such as PrEP and cash transfers that address underlying risks for HIV infection would not be prioritized under the optimization approach of these scenarios.

PrEP and cash transfers become deprioritized because of the costs of implementation are extremely high or their direct impacts on HIV transmission risk can be less than that of biomedical interventions. In the case of PrEP, the costs are very high; Currently, it is estimated that PrEP costs USD 320 per person-year of use in Tanzania. At this cost, incidence would need to be above 4.4% to have cost per infection averted under USD 5,000. With an incidence of 0.3% (PrEP would cost about USD 100,000 per infection averted, even when treatment savings are accounted for (Goals analysis), as replicated in the cost-effectiveness analysis for the optimization exercise which showed that PrEP targeted at high risk groups would cost USD 100,000 per infection averted.

Figure 8-4. PrEP Cost per Infection Averted versus Incidence among AGYW by Council
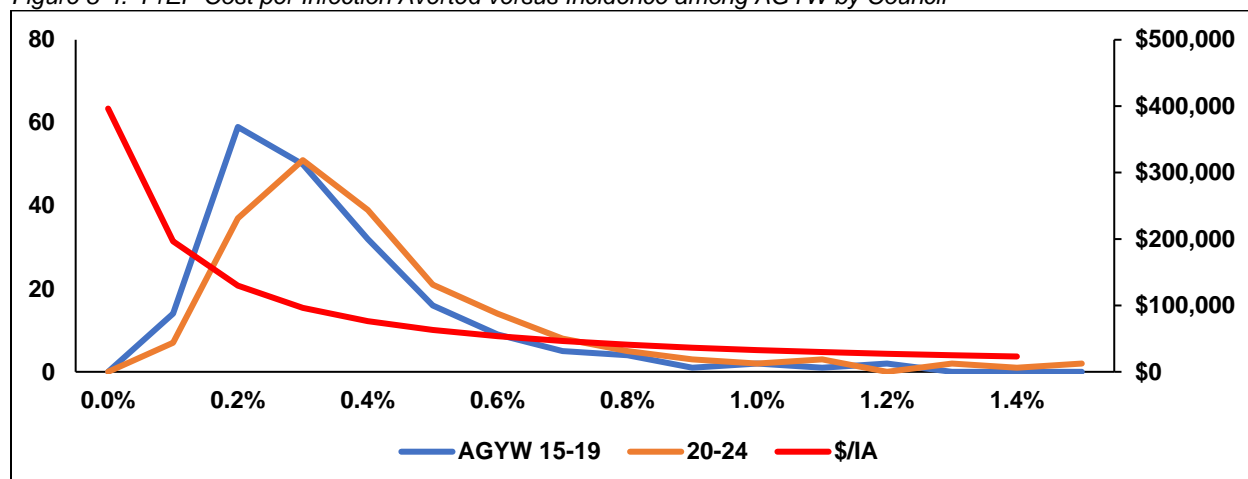
Research findings are mixed on the HIV-effects of cash transfers, and particularly for the direct HIV impacts. The strongest effect is seen on age at sexual debut (Stoner, 2019).[5] A national cash transfer program that cost USD 158 per person-year and raised age at sexual debut by 1 year (optimistic) would avert 9,500 new infections at a total cost of USD 500 M, or USD 50,000 per infection averted. The more conservative assumptions used in the Goals model in this exercise suggested that a cash transfer program would cost USD 1.54 M per infection averted. Unfortunately, the indirect benefits of these programs (such as female empowerment) have not been fully quantified and cannot be captured in a rigorous optimization exercise.

Targeting the highest incidence districts

Despite the poor cost-effectiveness outcomes, the structural impacts of the AGYW bundle of interventions should not be ignored. To fully address high incidence among AGYW, this multi-dimensional approach needs to be implemented.

One way to lower the costs of these interventions is to target based on geography. UNAIDS defines three risk categories for most AGYW programs, incidence >3%, 0.3%-3%, <0.3%. In Tanzania, no districts meet the high incidence threshold (>3% incidence) while 100 districts are classified as medium incidence and 94 as low incidence districts. About 37% of AGYW live in medium incidence districts and 63% live in low incidence. *Figure 8-5* shows the suggested targets for key AGYW interventions in high, medium, and low incidence districts. The condom and PrEP programs are targeted just to those AGYW with non-regular partners, but sexuality education and cash transfers are delivered to all AGYW in the district.

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[5]Unfortunately, the cash transfer program in Tanzania shows no evidence of impact on sexual behavior (TASAF, 2018)

Figure 8-5. Targets for AGYW program scale-up

Intervention	Target Population*	High incidence districts (>3%)	Medium incidence districts (0.3%-3.0%)	Low incidence districts (<0.3%)
Condom use	Sexually active	90%	90%	90%
PrEP	Sexually active	50% high risk 5% low risk	50% high risk 5% low risk	0%
Comprehensive sexuality education	All	90%	90%	90%
Cash transfers (Economic empowerment)	All	20%	20%	0%
VMMC for ABYM	All	90%	90%	0%

Notes: HR = High risk, sexually active in the past year with a non-regular partner

Modeling assumptions: AGYW prevention scale-up

To assess the costs and impact of this AGYW program scale-up, the AGYW prevention package scale-up was modeled independently of scaling up other interventions. Treatment nor testing were scaled beyond Constant Coverage levels.

Figure 8-6 Modeling assumptions for AGYW

Abbreviation	AGYW	
Coverage or funding-driven?	Coverage-driven for AGYW; All other interventions kept at Constant Coverage levels	
Coverage target	See *Figure 8-5* above	
Funding constraint	*PEPFAR*	NA (not funding-driven)
	Global Fund	NA
	Domestic	NA
	2030 funding level	NA
	Cumulative funding (2019-203)	NA
Optimization	No scale-up of other interventions/efficiencies beyond AGYW package	

Impact of AGYW program scale-up

Compared to the CC, the AGYW scenario would avert 33,000 new infections among adolescents and young adults, about 20% of those that would occur under the CC. This package alone would not avert as many infections as the NS or O-CCF scenarios since ART scale-up is not assumed.

Figure 8-7. New infections among AGYW 2019-2030
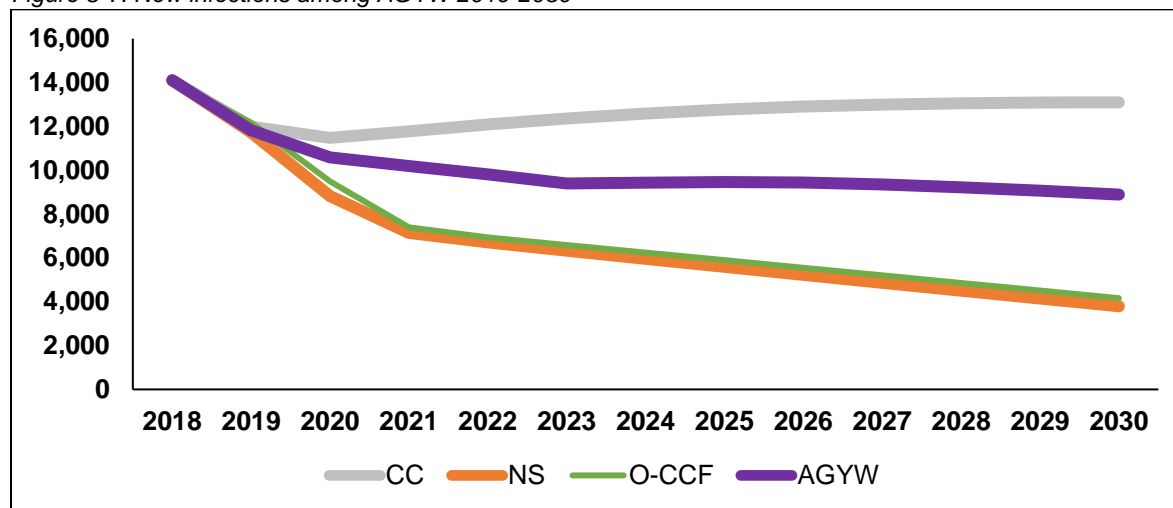
Costs of AGYW prevention scale-up

As expected, the costs of the AGYW scale-up would be expensive—even with assuming constant ART coverage, the total costs would start at over USD 150 M annually in 2030 and then would reach USD 275 M annually by 2030.

Figure 8-8. Costs of AGYW scenario compared to CC, NS, and O-CCF
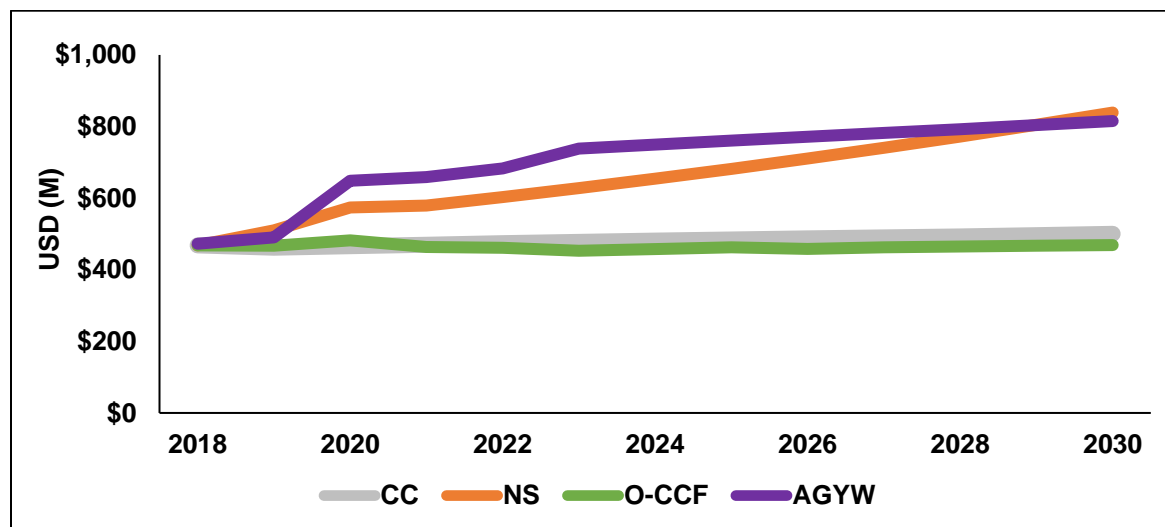
The costs of the different program components are shown below in *Figure 8-9.* Cash transfers would cost more than half the program (55%) at USD 1.4 B from 2019-2030. PrEP would represent more than a third of the program's costs at USD 852 M. VMMC, condoms, and sexuality education would account for less than 5% of the costs.

The costs of this set of interventions under no AGYW program scale-up are shown in the far-right column. These are the costs that would be seen for AGYW interventions under CC. In comparison to the CC package of AGYW interventions, the AGYW scale-up would cost almost USD 2.0 B more from 2019-2030.

Figure 8-9. AGYW scale-up costs broken down by intervention

(USD M)	Condoms	PrEP	Sexuality education	Economic empowerment (Cash transfers)	VMMC	Total AGYW	No Scale-up
2019	3	0	4	6	19	31	37
2020	3	19	5	106	20	153	38
2021	3	34	5	109	7	160	39
2022	4	47	5	113	8	177	40
2023	5	84	6	117	8	219	42
2024	5	87	6	121	9	227	43
2025	5	90	6	125	9	235	45
2026	5	93	6	129	10	243	46
2027	5	95	6	133	11	251	48
2028	6	98	6	137	11	259	49
2029	6	101	7	141	12	267	50
2030	6	104	7	145	13	274	52
Total (%)	55 (2%)	852 (34%)	69 (3%)	1383 (55%)	137 (5%)	2,496 (100%)	528

Cost-effectiveness of AGYW prevention scale-up

When compared to CC, the cost per additional infection among 15-24-years averted of the scaled up AGYW program would be USD 56,636. This incremental cost-effectiveness ratio is not favorable in Tanzania's limited resource setting. But it must be emphasized that cost-effectiveness is not the only criteria for justifying investments. The disproportionate vulnerability of AGYW could justify these investments and to reach epidemic control, these investments may be necessary in the long-run.

Figure 8-10. Cost-effectiveness of AGYW scale-up

	Costs (USD)	Incremental costs (USD)	Infections averted 15-24 yrs	Incremental infections averted 15-24 yrs	Incremental cost per infection averted (USD)
CC	528 M	-	164,000	-	
AGYW	2,496 M	1,968 M	131,000	33,000	56,636

Financing AGYW prevention scale-up: Cost-sharing

Another argument for AGYW investments is that the costs of AGYW should not be borne by or attributed to the HIV program alone. As shown in *Figure 8-2* above, these HIV interventions have both direct HIV and indirect impacts that change the structural conditions for HIV transmission but may also have benefits to other social and economic programs.

For example, Remme et al. (2014) have argued that HIV programs should be responsible for only part of the costs of cash transfer programs, since benefits also accrue to other sectors. These authors suggest the fair share for HIV is about USD 42 per person per year.

At USD 42 per person and focused on the 10% of districts with the highest incidence, cash transfers would be cost-effective at USD 2,350.

Under this type of cost-sharing arrangement, the HIV resources required for the AGYW program would shrink to USD 1.5 B (by 25%). PrEP would then require the greatest share of resources. Similar arguments could be made for other AGYW interventions.

Figure 8-11. Resource requirements of HIV program under full and partial cost sharing of cash transfers
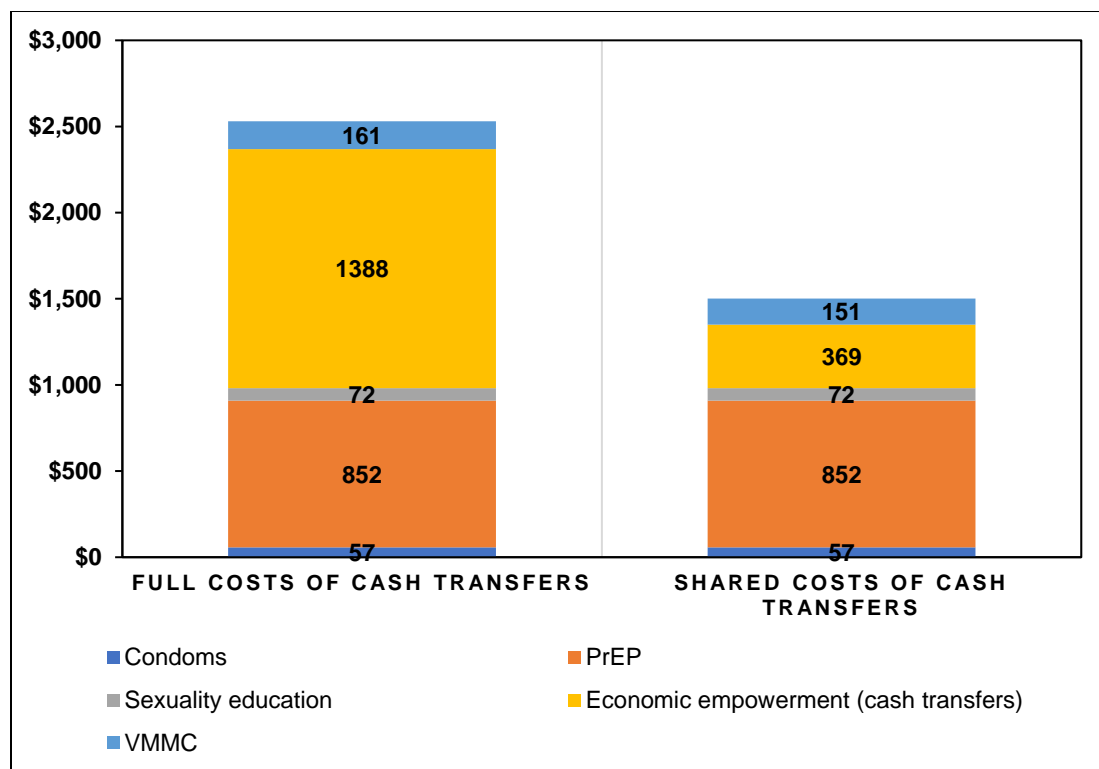
Takeaways on AGYW prevention program scale-up

Reducing new infections among AGYW is an important program challenge that must be addressed through expanding prevention efforts. For this package of interventions, it is not a matter of only maintaining current programs or committing to a final push to close a small gap, but rather intense scale-up will be required. Closing these large gaps will require additional investments beyond current spending. Scaling up a comprehensive AGYW prevention package nationally will require an intensive level of resources over time-– a cumulative total of more than USD 2.0 B over the next 12 years and an annual spending of USD 270 M in 2030, about 4-times greater than current annual spending on AGYW prevention interventions.

In the previous funding-constrained analyses, interventions apart of the AGYW prevention package, like PrEP and cash transfers, were not prioritized given the competing need to maximize ART and overall infections averted through very low-cost, highly effective interventions like VMMC and condoms. However, to ultimately reach epidemic control, AGYW initiatives will have to be scaled as well. The large costs of expanding these activities will be hard to finance and sustain in Tanzania in the current harsh funding environment, but solutions such as cost-sharing with other sectors should be explored. Moreover, as new opportunities for efficiency in ART delivery or testing come about, funding could also be re-allocated to the AGYW program.

CHAPTER 9. CONCLUSIONS

Summing up the Investment Case for HIV 2.0

Looking to the next decade, Tanzania will have to meet and sustain even more ambitious program targets, and may have to do so with flat-lined or declining donor contributions. Tanzania has committed to achieving 95-95-95 program targets by 2025, maintaining this over time, and by 2030 reaching Fast Track targets of a 90% reduction in new infections and mortality from 2015 levels. Several years ago, Tanzania and most other countries would call for significantly more money to achieve these expanded targets, especially from external partners. Tanzania has benefitted from increasing external contributions for many years, but it now appears that donor allocations for Tanzania may have reached their peak. Donors are not withdrawing immediately, but additional money from them seems less likely. PEPFAR has announced a significant reduction for the coming year. Domestic resource mobilization needs to increase. And the donor and domestic funds that are available in the future will have to stretched to not only maintain the current program but also keep pushing towards 2030 goals.

1. *Complacency would result in too many new infections and increasing AIDS-deaths*

Despite tremendous progress to date, the current national program is not on a trajectory to propel Tanzania towards 95-95-95 or 2030 Fast Track targets. Resignation to current ART and prevention coverage and not pursuing optimization at scale will have serious consequences – modeling conducted for IC 2.0 suggests that this would lead to new infections continuing at high levels, over 40,000 annually, and to AIDS-related deaths increasing over time. Despite coming up short on impact, this approach will still cost over USD 500 M annually.

2. *The National Strategy is (too) expensive*

The National Strategy is comprehensive and could enable Tanzania to get close to its Fast Track targets. However, it is the most expensive option explored in IC 2.0, and its affordability is very doubtful. The full package of NS interventions, implemented under current delivery service paradigms as described in the national policy documents, would cost USD 8.1 B from 2019 to 2030, 40% higher than the estimated cost of Constant Coverage. By 2030, resource needs would rise to USD 839 M a year, double the expenditure of the current national program.

3. *Optimized use of funding could achieve National Strategy goals*

Fortunately, there is still room to scale more efficient implementation approaches in Tanzania. Optimization at scale would still only require current funding levels but would achieve much further progress towards NS goals. Key components of optimization at scale would involve:

a) Allocative efficiency

Continuing to prioritize prevention funding to interventions based on lowest cost per infection averted would maximize impact using scarce resources. IC 2.0 identified the most cost-effective interventions over the next 10 years as VMMC, condoms, and the Female Sex Worker package. Over this time period, further optimization would require about USD 100 M re-allocated to VMMC, USD 25 M to condoms, and USD 50 M to FSW outreach and PrEP during 2019-2030 compared to Constant Coverage (baseline) distribution across interventions.

It may be difficult to cut programs that are less cost-effective (BCC, cash transfers), since these programs are already being implemented at significant scale and have buy-in from service providers and communities. These programs, such as behavior and communication change programs, could potentially be integrated into other community-based interventions or initiatives. Program managers and community

leaders will have to be consulted on these decisions to ensure that the rationale behind a reallocation effort is well understood.

b) Technical efficiency in ART delivery:

Since the ART program will have to put more than 450,000 additional individuals on treatment to achieve national goals, and treatment currently absorbs 50% of all HIV spending in Tanzania, lowering the cost of ART per PLHIV would help tremendously to expand the impact of available funds. The efficiencies in ART delivery recommended in IC 2.0 include: scale-up of Dolutegravir-based regiments for first-line ART, full implementation of differentiated service delivery recommendations for lab testing, and emphasis on community-based treatment support services. Some of these efficiencies are already in place, such as Dolutegravir and simplified lab algorithms Improving the technical efficiency of ART delivery through scaling up these actions could reduce ART costs by 25%, amounting to a savings of over 50 M annually, more than 10% of current HIV spending in Tanzania. The evidence behind these approaches is strong and there appears to be good national buy-in, but implementation of these policies is still in the early stages, e.g., DTG, or is still nascent and requires significant discussion and debate, e.g., community-based support services.

c) More efficient testing strategy

Currently, annual expenditure on HIV testing and counseling is about USD 50 M, and only about 61% of PLHIV are aware of their status. The IC 2.0 efficiency analysis suggests that Tanzania can reach the target of 90% of PLHIV aware of their status by 2025 by spending even less than today. This more efficient strategy would involve focusing on scaling up PITC, VCT, and self-testing through 2022 and then keeping PITC and self-testing volumes high when VCT scales back post 2022. Until 2022, volumes of PITC and self-testing should be about 3-4 million tests and VCT at 800,000 annually. After VCT scale down, PITC and self-testing volumes would need to reach 4-5 million tests annually. This strategy would cost less than USD 40 M annually, at least 5 M less annually compared to the current strategy.

4. *If donor funds continue to decline and there is no countervailing government domestic resource mobilization, the national HIV program will be at serious risk, even with optimization.*

If PEPFAR and Global Fund allocations decline even gradually in the coming years, consistent with recent signals from the two donors (the IC 2.0 models these declines at 15% for PEPFAR and 10% for the Global Fund over each three year period in the future), not only is additional progress towards 95-95-95 goals at risk, but past gains could also be reversed. Declines in donor funding with no commensurate increase in domestic funds would lead to both new infections and deaths increasing over time -18,000 new infections and 39,000 AIDS-related deaths annually by 2030. Although it is impossible to know with certainty the pace of donor decline due to the short budget cycles of PEPFAR and the 3 year replenishment periods of the Global Fund, this scenario is one that Tanzania now needs to guard against, since the global outlook for donor aid for HIV (and other health priorities) is less positive than it was a few years ago. Given trends in cuts to external financing in 2019, Tanzania must be prepared for the worst case.

5. *Gradual domestic resource mobilization could maintain current funding levels, also achieving National Strategy goals*

If donor funds decrease in the coming years, domestic resource mobilization becomes pivotal to safeguard the gains achieved in the national HIV response and keep Tanzania moving toward its 2030 goals. Based on a detailed fiscal space analysis conducted for IC 2.0, which assumes rapid and continued economic growth, it was estimated that the Government could feasibly mobilize an additional USD 10-15 M a year each year from now to 2030, from a combination of MOH budget increases, national health insurance resources, and special HIV Fund levies. This pace of domestic resource mobilization driving public funds from USD 55 million in 2018 to USD 174 million by 2030 (Figure 7-2) could offset

possible projected declines in donor funding and maintain annual HIV funding at close to current levels (even though under this scenario Tanzania would still only cover about 40% of total HIV spending with domestic sources in 2030, continuing high dependence on donors).

Discussions about domestic resource mobilization for HIV are not new in Tanzania. The AIDS Trust Fund was set up in 2016 and the previous investment case 1.0 spoke to potential mechanisms to spark additional domestic contributions. Yet little has happened over the past 3 years to expand national funding. Investment Case 2.0 analysis shows that discussions must now be turned into action.

The Investment Case 2.0 puts forward feasible targets for how domestic funds could be increased gradually over time. These increases are based on solid projections of economic growth and increases in government health spending in Tanzania. These modeled increases in annual HIV spending would still place Tanzania behind other neighboring countries and would amount to less than half of estimated spending in 2030 – Tanzania would still be donor-dependent. In this sense, the expanded resource mobilization scenario should be seen as conservative -- ideally Tanzania would commit even more funds to HIV than what is proposed here.

To mobilize these funds, several mechanisms seem most promising and feasible. The first would simply be to increase the Ministry of Health budget allocation for HIV above the modest 4% currently assigned to the national response to over 7%. Adding HIV services as a benefit to the National Health Insurance Fund (NHIF) package would also making an important difference: a recent study suggests that the NHIF could absorb USD 24 M in incremental costs for HIV services, covering 96,000 people living with HIV (Health Policy Plus 2016). The AIDS Trust Fund (ATF) was set up by the Government in 2016 with a target of covering 30% of total HIV expenditure, but has not yet realized its potential. If the Government of Tanzania were to meet its current pledge of USD 2.7 M for the ATF and have this matched by private sector contribution, the Fund could make a positive difference. The Community Health Fund, social impact bonds, blended finance, and public/private integration appear to be less feasible but could be explored as additional sources of domestic resources for HIV.

6. *Scaling up a comprehensive package of AGYW interventions is an important program challenge that will require significant funding outlays beyond current spending and tailored financing solutions outside the scope of Optimization*

Addressing structural roots of high risk of HIV infection among AGYW is a key challenge that to fully address will require significant funding outlays beyond current spending. The analysis in IC 2.0, which focuses on optimization of prevention spending based on cost-effectiveness within tight resource constraints, does not make it easy to justify spending on this innovative program, since it is very expensive compared to equally important but less costly prevention interventions like VMMC and condoms. Modeling for IC 2.0 suggests that a comprehensive prevention package for AGYW would cost USD 150 M annually in 2020, rising to USD 275 M by 2030 – more than half of what Tanzania is spending in total to fight AIDS. It is difficult to see where the additional funds would come from. However, given the long-run payoffs from protecting adolescent girls and young women from HIV infection, extra investments in these areas may be justified. Particularly in the case of AGYW, where the benefits of female empowerment are wider than in HIV and health (for example, in increased girls' education and livelihoods), the extra costs of the program should be shared with other sectors and ministries.

7. *Tanzania can rise to the challenges presented here*

Although this challenge is difficult and daunting, Tanzania could continue to advance toward the Fast Track targets for 2030 and move to epidemic control if the country follows a dual strategy, along the lines of what is contained in IC 2.0, to (a) pursue optimization of spending (allocative and technical efficiencies and efficient testing) and (b) mobilize feasible levels of domestic financing. In this sense, IC 2.0 could help to promote a health policy dialogue around focusing on efficiency and greater country financial responsibility, rather than advocating for large and unrealistic amounts of extra external funding.

The main recommendations of the investment case include:

- Even in the best cases for funding, optimization of prevention and treatment programs must be pursued.
- Optimization means shifting prevention resources from less cost-effective interventions to the most cost-effective interventions. Assuming Constant Coverage funding levels are maintained, this would entail a reallocation of USD 175 M to VMMC, condoms, and FSW prevention services over the coming decade.
- Optimization requires that Tanzania and its donor partners committing to ART efficiency gains in Dolutegravir-based first-line regimens, more streamlined lab algorithms for stable patients, and community-based delivery of support services for PLHIV on ART. This could save over USD 50 million annually – 10% if what is currently being spent to fight AIDS in Tanzania.
- Implementing a more efficient testing strategy, expanding on recent efforts by government and donors to prioritize cost-effective modalities with high yield, will cost less and help close the first 90 gap, reaching 90% of PLHIV aware of their status by 2025.
- Domestic resource mobilization must be strengthened, with feasible increases of USD 10-15 M a year and a goal of reaching USD 175 M annually in domestic spending by 2030.
- Domestic resource mobilization mechanisms include increasing the government budget to HIV, adding HIV as a benefit to the National Health Insurance Fund, and using the AIDS Trust Fund.

Achieving maximum impact

Operationalizing the IC recommendations

Clearly, these changes in the composition, management, and financing of the national HIV response will be difficult to implement. If funds are to be shifted away from certain prevention services such as BCC, painful reductions in certain existing programs will need to take place. At the same time, capacity to cope with and manage effectively areas of expanded prevention such as VMMC and female sex worker services will have to be built up rapidly. The same can be said for actions to increase the efficiency of HIV treatment and save tens of millions of dollars – this will require challenging efforts by Tanzania to change its policies and practices surrounding lab testing for stable patients and to expand community-based adherence support.

Similarly, there is no doubt that it will be hard for Tanzania to persuade its key donors to maintain their current levels of financial support, and the Ministry of Finance to expand steadily the amount of domestic funding going to the national HIV program. For the former, TACAIDS and NACP will have to show strong progress toward targets for 2020 2025, and 2030, and evidence of improvements in program efficiency – and will have to hope that circumstances beyond the country's control, such as the size of Global Fund replenishments, turn out to be favorable for Tanzania.

For the latter, while there is no doubt that the USD 10-15 million a year increase in domestic public funding for AIDS is affordable for Tanzania, expanded allocations for HIV will have to compete with many other health priorities such as immunization, child health, and chronic disease management. Government and other advocates for HIV will thus have to make a strong case for more money from the health budget and national health insurance and for increased revenue collections in the AIDS Trust Fund. This is happening in other nearby countries such as Kenya, Uganda, and Namibia, demonstrating that this is possible in Tanzania, too.

Suggested actions to facilitate the implementation of recommendations include:

1. Revise allocations across prevention – some programs will have to give up a piece of their funding
2. Implement the 3 highlighted treatment efficiencies as rapidly as possible

3. Scale the Ministry of Health's HIV testing strategy, accounting for the IC 2.0 recommendations to save money and close testing program gaps
4. Make the investment case to MoH and MoFP leadership for more domestic budget for HIV (USD 10-15 m/year for a decade)
5. Revise NHIF to include HIV testing and treatment as insured benefits
6. Revitalize the AIDS Trust Fund
7. Organize a high-level technical group on "Optimization" to agree on, set targets for, and monitor progress toward the recommendations of IC 2.0, with high level political oversight and support from TACAIDS, NACP, MoFP, and the major donors
8. Negotiate a "shared responsibility" plan with the key donors
9. Build the Optimization Plan into the next COP and the next Global Fund grant request

Critical enablers and synergies

At the same time, the overall enabling environment for the HIV response must be strengthened to support additional scale-up efforts and sustainability of the program. Efforts to combat stigma and discrimination must be double downed through media campaigns and promoting legal literacy to ensure there is equitable access to services. Similarly, given the sharp rise in new infections among adolescent girls, gender-based violence prevention and economic empowerment must be priorities to ultimately reverse this trend. Social protection measures can also help to address the elevated risk of new infection among women. There is also more progress to be made in Tanzania on reforming norms and laws that continue to limit access to prevention and treatment services and put certain populations at disproportionate risk. Some of these laws that require advocacy to challenge include age of consent, bans on self-testing, and supporting scale-up of PrEP.

A strong, integrated health system will also further support the sustainability of the HIV response as donor funds decline. Facilities, labs, and commodity procurement must be able to support increased volumes of HIV tests and patients on treatment. Integration of HIV services into primary healthcare will reduce inefficiencies and relieve the health system, in addition to providing more holistic care to patients in the long-run. High-quality care will have to be available at all levels of the health system, and additional investments in community health workers and CSO filed workers will likely be required to achieve this.

Call to Action

If Tanzania does not take action on the IC 2.0 recommendations, the progress of the response to date could be jeopardized. If too little resources are available once donor funds decline, then it will be impossible to maintain and grow ART coverage. Positive trends will be reversed, and epidemic control will no longer be within sight. Given the additional lives saved and infections averted this additional investment would lead to, it is not surprising that 660 M of total domestic investment over the period to 2030 would yield an economic benefit of USD 4.3 B for Tanzania (Lamontagne et al 2019).

While it will not be easy for Tanzania to adopt and adapt to the kinds of recommendations contained in this IC 2.0 report, there is no doubt that it is within Tanzania's grasp to make these changes and enhancements to its HIV response. High level political will and hard work by program managers is needed to make these recommendations a reality. Given the importance of protecting the large gains already achieved in the fight against AIDS, and the positive impact that further progress toward 90-90-90 and virtual elimination of HIV can have for the future of Tanzania's people, it is vital for the country to galvanize its political, human, and financial resources around the recommendations in this report and to implement them swiftly and progressively over the next few years. If Tanzania's response to known challenges is slow, it is unlikely that targets will be reached and the consequence of this negative impacts will perpetuate long after 2030 and will have a long-lasting impact on Tanzania's development status and its ability to meet SDGs.

ANNEXES

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Annex 1. List of stakeholders consulted- November 2018

UNAIDS	ICAP
TACAIDS	CHAI
NACP	Tanzania Private Sector Foundation
CDC	Association of Tanzania Employees
UNICEF	Medical Stores Department
WHO	World Bank
PEPFAR	Tanzania National Coordinating Mechanism
USAID	Health Division, PORALG
PSI	

Annex 2. Agenda for Technical Working Group Meeting- February 2019

9:00 am - 10:15	**Technical Working Group Meeting, Part I** **Introduction of investment case** • Opening Remarks – TACAIDS Executive Director • Remarks – UNAIDS Country Director • Introductions of other TWG members • Recap of investment case objectives and review of findings to date (context, framing questions, major policy questions and stakeholder requests) – Pharos/Avenir
10:15 – 10:30	**Coffee break**
10:30 – 13:00	**Technical Working Group Meeting, Part II** **Presentation of scenarios** • Presentation of preliminary scenarios – Pharos/Avenir • Discussion and feedback on scenario design
13:00 – 14:00	**Lunch break**
14:00 – 16:00	**Technical Working Group Meeting, Part III** **Review key assumptions and missing data** • Complete scenario discussion, as needed • Discussion of missing data and key assumptions: epi assumptions, coverage assumptions, cost assumptions, and financing projections • Recap discussions from today • Map follow-up responsibilities and discuss investment case process – Pharos/Avenir

Annex 3. HIV prevalence in Tanzania by age and sex

Age group	Males Percentage HIV positive	Males Number	Females Percentage HIV positive	Females Number	Total Percentage HIV positive	Total Number
0-17 months	0.1	538	0.4	525	0.3	1,063
18-59 months	0.2	1,312	0.7	1,251	0.4	2,563
5-9	0.5	1,661	0.5	1,607	0.5	3,268
10-14	0.3	1,345	0.3	1,377	0.3	2,722
Total 0-4	0.2	1,850	0.6	1,776	0.4	3,626
Total 0-14	0.3	4,856	0.5	4,760	0.4	9,616
15-19	0.4	2,533	1.0	2,999	0.7	5,532
20-24	0.9	1,987	3.4	2,845	2.2	4,832
25-29	2.3	1,670	5.6	2,521	4.0	4,191
30-34	3.9	1,453	8.6	2,062	6.4	3,515
35-39	5.6	1,307	11.6	1,749	8.6	3,056
40-44	8.4	1,144	11.0	1,405	9.7	2,549
45-49	6.8	877	12.0	1,048	9.4	1,925
50-54	7.4	728	9.4	872	8.4	1,600
55-59	8.0	572	9.7	580	8.9	1,152
60-64	3.6	459	6.5	558	5.2	1,017
65-69	2.3	344	3.0	395	2.7	739
70-74	1.7	254	4.4	322	3.3	576
75-79	2.0	193	0.2	221	1.0	414
≥80	0.3	229	1.2	252	0.8	481
Total 15-24	0.6	4,520	2.1	5,844	1.4	10,364
Total 15-49	3.1	10,971	6.2	14,629	4.7	25,600
Total 50+	5.0	2,779	6.5	3,200	5.8	5,979
Total 15-64	3.5	12,730	6.5	16,639	5.0	29,369
Total 15+	3.4	13,750	6.3	17,829	4.9	31,579

Source: Tanzania HIV Impact Survey 2016-2017

Annex 4. Goals model

The Goals model is a computer model that links program goals to financing levels (Stover et al 2006). The model divides the adult population 15-49 by sex and risk group (not sexually active, low risk stable couples, medium risk people engaging in casual sex, sex workers and clients, men who have sex with men and injecting drug users).

The Goals Model links to the AIDS Impact Model (AIM) module in Spectrum to estimate the impact of interventions on the population between the ages of 15 and 49. The Goals model also has an impact matrix that summarizes the impact literature to describe changes in behavior by risk group as a result of exposure to behavior change interventions (Bollinger 2008).

Additionally, AIM includes the impact of prevention-of-mother-to-child transmission (PMTCT) programs on the number of pediatric infections. A full description of the methods used in the Goals Model can be found in the model's manual (Stover 2011). The Goals model is linked to the AIM module in Spectrum that calculates the effects on children (0-14) and those above the age of 49.

The model has been set up for Tanzania using all available data sources to specify the distribution of the population by risk group, the behaviors for each risk group (number of partners, number of sexual acts per partner per year, condom use, and proportion married).

Additional details on the Goals and AIM models are available from several publications (Stover, 2014a; Stover, 2014b).

Figure 4A-1. Schematic of Goals model
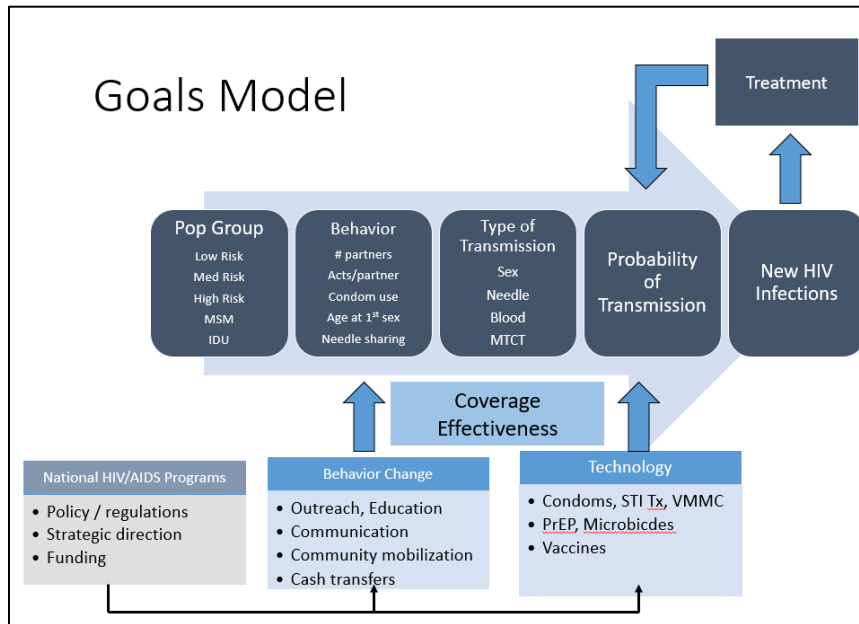
Source: Avenir Health

The UNAIDS recommended packages of prevention interventions for each risk group include in the Goals model are shown below in *Figure 4A-2*.

Figure 4A-2. Packages of prevention interventions included in Goals model

	AGYW	FSW	Women 25+ with multiple partners	Lower risk women	ABYM	Male clients	MSM
Condoms	X		X	X	X	X	
VMMC					X		
PrEP	X	X	X	X	X		X
PEP	X	X			X		X
Cash transfers	X						
VCT	X				X		
Self-testing	X	X			X		X
Demand creation	X						
Sexuality education	X						
Economic/community Empowerment	X	X					X
Outreach		X					X

In addition, these other interventions are included in the Goals model:

- Treatment, care, and support
- PMTCT
- HCT
- Blood safety
- Universal precautions
- Post-exposure prophylaxis

Coverage levels for these interventions are shown in *Figure 4A-3* below compared to IC 1.0 levels.

Figure 4A-3. Baseline coverage levels for IC 2.0 compared to baseline for IC 1.0

Intervention	Coverage IC 1.0 (2016)	Current coverage (2018)	Sources
HIV testing and counseling			
% of PLHIV who know their status (Men)	47%	52%	IC 1.0; THIS 2016-2017
% of PLHIV who know their status (Women)	62%	65%	IC 1.0; THIS 2016-2017
Prevention			
Condom promotion (% of adults who reported condom during last sex)	44%	M- 35%/ F -27.78%	IC 1.0; THIS 2016-207
Condom promotion (% of youth who reported condom during last sex)	NA	F-37%/ 42%- M	IC 1.0; NMSF IV
VMMC (ages 15-29)	83%	81%	THIS 2016-2017
PMTCT (% of HIV- positive pregnant women who are on ART)	71%	98%	THIS 2016-2017
Behavior change (including mass media, community mobilization, school-based education and outreach to out-of-school youth)	Low	Low	IC 1.0
AGYW			

Cash transfers	0%		
Key population outreach:			
-FSW	11%	69%	IC 1.0; NMSF IV
-MSM	40%	40%	IC 1.0
-PWID	20%	20%	IC 1.0
PrEP	0%		
Treatment, care, and support			
ART (% of all PLHIV)	44%	61%	IC 1.0; THIS 2016-2017
% of people on ART after 12 mo	75%	78%	IC 1.0; NMSF IV

The model calculates new HIV infections by sex and risk group as a function of behaviors and epidemiological factors such as prevalence among partners and stage of infection. The risk of transmission is determined by behaviors (number of partners, contacts per partners, condom use) and biomedical factors (ART use, male circumcision, prevalence of other sexually transmitted infections). Interventions can change any of these factors and, thus, affect the future course of the epidemic. Key epidemiological parameters are shown below in *Figure 4A-4.*

Figure 4A-4. Key epidemiological factors for Goals

Parameter	Value	Source
Transmission of HIV per act (female to male)	0.0011	Baggeley et al (2010)

Multiplier on transmission per act for
  -   Male to female
  -   Presence of STI
 	
  -   MSM contacts
	
	1.0
	8
	
	2.6
		
		Galvin and Cohen (2004) 2.2-11.3
		Powers et al (2008). 5.1-8.2
		Vittinghoff et al (1999)

Relative infectiousness by stage of infection
  -   Primary infection
 	
  -   Asymptomatic
  -   Symptomatic
  -   On ART
	
	9 –
	40
	1
	7
	0.04 – 0.08
		
		Boily et al (2009) 9.17 (4.47-18.81)
		Pinkerton (2008)
		Reference stage
		Boily et al (2009). 7.27 (4.45-11.88)
		Cohen et al (2011)
		Attia et al (2009)

Efficacy in reducing HIV transmission
  -   Condom use
  -   Male circumcision
  -   PrEP
 	
  -   Microbicide
	
	0.8
	0.6
	0.55 – 0.73
	0.6
		
		Weller and Davis (2004)
		Auvert et al (2005), Gray et al (2000), Bailey et al (2007)
		Grant et al (2010)
		Partners PrEP Study
		Karim et al (2010)

The following figures show how the Goals model was calibrated to Tanzania local data.

*Figure 4A-5. The Goals model fit to survey prevalence, 15-49, males and females*
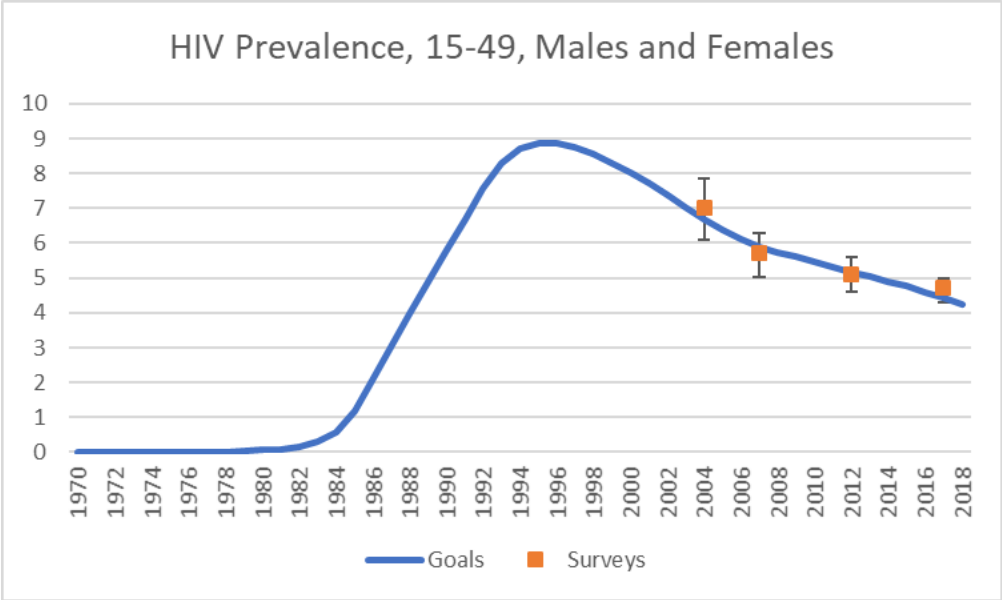
*Figure 4A-6. The Goals model fit to survey prevalence by age and sex, males*
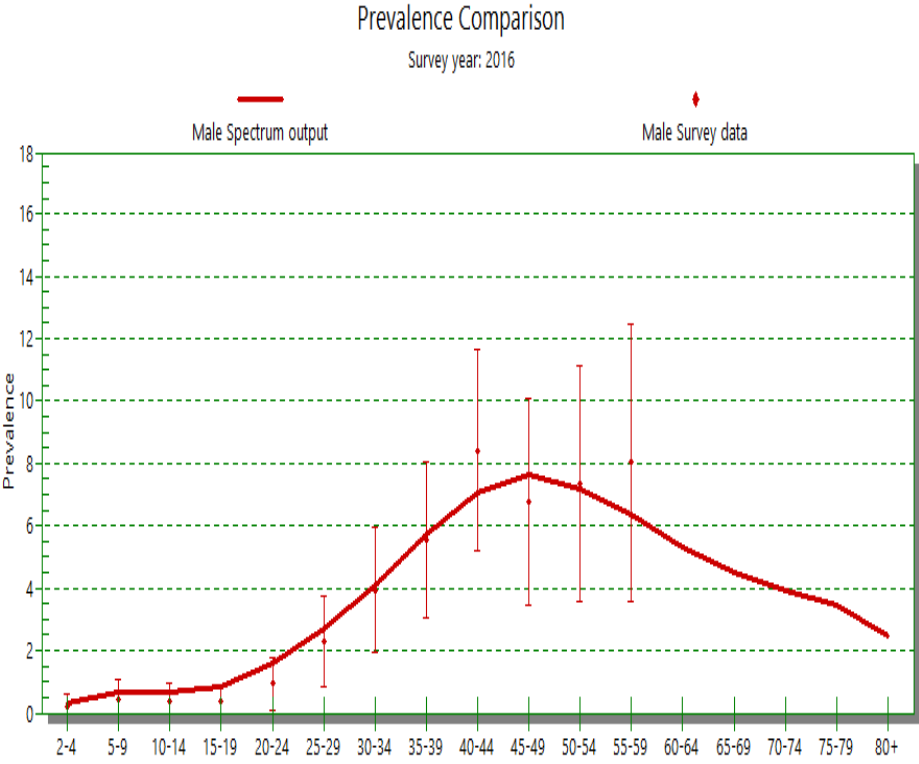
Figure 4A-7. The Goals model fit to survey prevalence by age and sex, females

Prevalence Comparison
Survey year: 2016
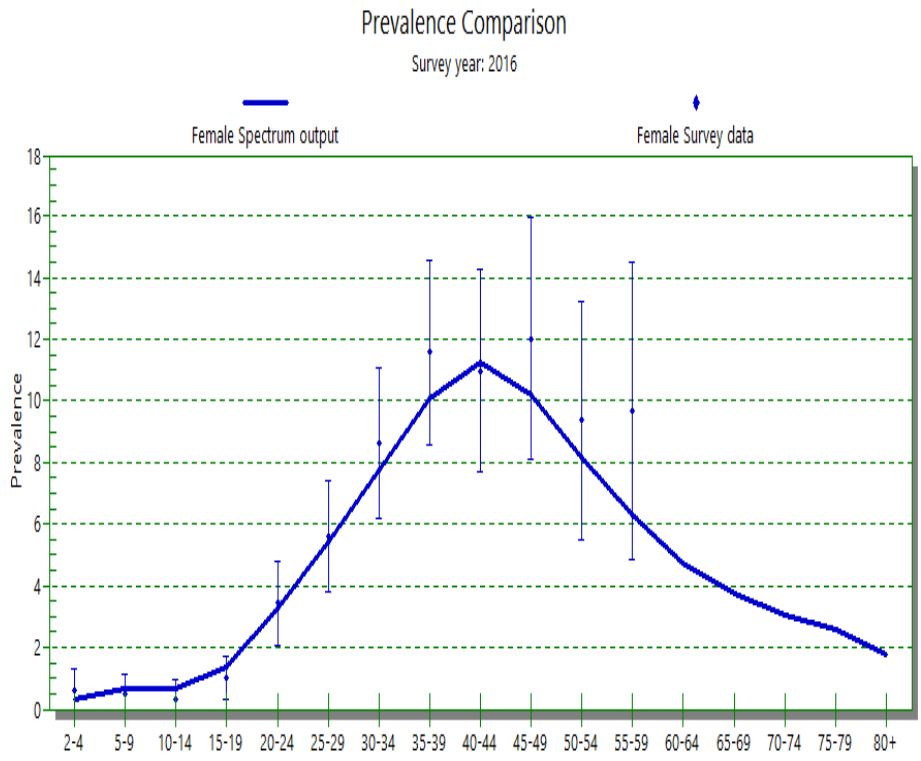
Figure 4A-8. The Goals model fit to survey incidence
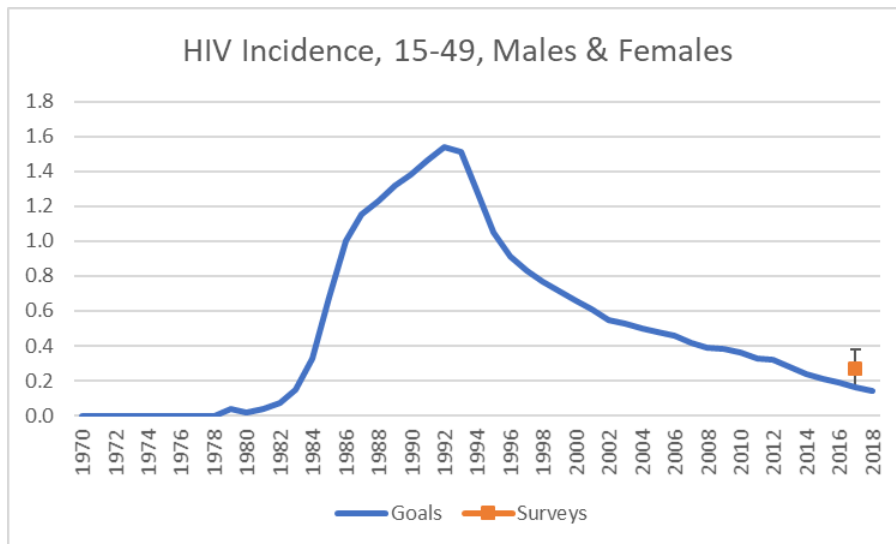
Annex 5. Unit costs

Figure 5A-1. Unit costs for key Goals interventions

Intervention	Unit Cost (USD)	Source and notes
ART	$205 /patient/yr	MoHCDGEC ,CDC, and ICF International (2016a). This cost was brought up to 2019 terms and adjusted for new VL recommendations. Original cost was $189
VMMC	$50 /VMMC	PEPFAR COP 2016
HTC	PITC $3-$10 VCT $15 Community-based $21 Self-tests $2	Mwenge et al (2017) Forsythe et al (2002) Chang J (2016) Mangenah (2017) MoHCDGEC CDC, and ICF International (2016b)
Condom	$0.07 /condom distributed	Based on regional average
Sex worker outreach	$61 /SW reached	PEPFAR COP 2016
MSM outreach	$83 /MSM reached	PEPFAR COP 2016
PMTCT	$287 /per woman treated	From CDC PMCT costing data, excludes ARVs Most costs are included in ART
PrEP	$320 /per recipient	Forthcoming from Kenya
Cash transfers	$158 /per recipient	World Bank (2016)
Program support	24% of direct costs	Weighted average based on analysis of PEPFAR, Global Fund and Domestic HIV expenditure

Figure 5A-2. More details on ART unit cost

USD	2015	Notes
Average cost of ART per person reached	$189	This unit cost was adjusted to 2019 economic terms in unit cost assumptions
ARVs	$95	
Personnel	$35	
Lab services	$20	
Hospital admissions	--	
Viral load?	8% of facilities	At the time of the ART costing study, only 8% of facilities were using VL testing. We adjusted this figure to account for 63% of patients receiving VL testing (Forsythe et al 2018)
Study population	All ART patients	
Year of data collection	2012-2013	

Source: Tanzania Ministry of Health, Community Development, Gender, Elderly, and Children, U.S. Centers for Disease Control and Prevention, and ICF International. (2016). The Cost of Comprehensive HIV Treatment in Tanzania. Dar es Salaam, Tanzania and Atlanta, GA (USA): U.S. Centers for Disease Control and Prevention

Annex 6. Geographic prioritization results

For the Investment Case Optimization analysis, incidence was estimated by district. Among the highest incidence districts identified (>0.30% annual incidence), almost all are already PEPFAR highest priority districts. This result implies that spending is already highly prioritized geographically and there is not much scope to further maximize prevention spending from the geography perspective.

Number of Districts by Incidence

Incidence	Number of Districts
0.00	0
0.10	5
0.20	71
0.30	71
0.40	21
0.50	14
0.60	5
0.70	3
0.80	2
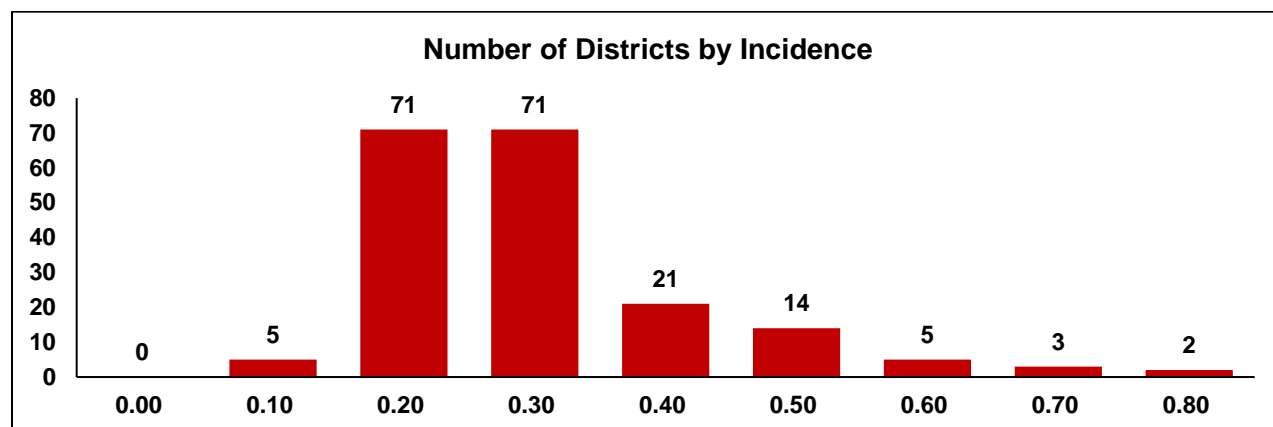
For reference, the names of the districts within incidence bucket are shown below--

0.3-0.39	0.4-0.49	0.5-0.59	0.6-0.69	>0.7
Songea MC	Njombe DC	Makambako TC	Mufindi DC	Mafinga TC
Mlele DC	Mbeya DC	Kongwa DC	Buchosa DC	Njombe TC
Mbinga TC	Rorya DC	Madaba DC	Pangani DC	
Bukoba MC	Mbarali DC	Kyela DC		
Nyamagana MC	Waging'ombe DC	Makete DC		
Kahama TC	Mbeya CC			
Tanga CC	Iringa MC			
Misungwi DC	Songwe DC			
Muleba DC	Bagamoyo DC			
Kilolo DC	Busokelo DC			
Kyerwa DC	Handeni TC			
Magu DC	Korogwe TC			
Rufiji DC	Kibaha DC			
Bukoba DC	Missenyi DC			
Ulanga DC				
Lindi MC				
Mtwara MC				
Iringa DC				
Mbozi DC				
Ludewa DC				
Morogoro MC				
Nzega TC				

Annex 7. Identification of technical efficiencies

To model the potential cost savings of technical efficiencies, first a list of changes to be considered needed to be identified. The Investment case 1.0 was used as a starting point. Since the investment case 1.0 did not distinguish between coverage enhancing interventions and technical efficiencies. Progress to date on the implementation of these innovations is noted in *Figure 2-8* in Chapter 2.

Overall, limited progress on implementation of innovations from IC 1.0 has been achieved. Community-based support services continue to be considered and could help increase the quality of services overall. NACP published an updated HTC strategy in 2019 that does prioritize targeted approaches to increase testing coverage, including index testing and community-based testing approaches. PEPFAR also plans to expand DREAMS (PEPFAR 2018a) and the Global Fund has supported bundled packages for adolescents as well. These interventions are important, but as described are coverage enhancing interventions and will require additional funds at a time when the program is facing potential budget cuts.

Since the previous investment case, a few promising policy changes that could reduce HIV program costs have been introduced or have the potential to be expanded, including Dolutegravir-based ARV regimens and full implementation of differentiated care models. Two to three-month ARV prescriptions were already in place for stable patients in Tanzania, but there was interest among some stakeholders to transition to six-month prescriptions and more efficient lab testing algorithms. Policies such as community-based service delivery models and retention programs could improve the quality of services and reduce costs to the overall health system.

The list of technical efficiencies to consider gathered from stakeholder consultations and literature review is shown below. The criteria to be included in this analysis: Relevant to current HIV program 2) Evidence of cost-saving and 3) Politically feasible. The efficiencies fell at 3 different phases of implementation.

Figure 6A-1. List of technical efficiencies considered and criteria for inclusion

	Relevant as new technical efficiency	Evidence for cost-saving	Politically feasible	Meets all criteria
Test & Start	No, already occurring at scale	No	Yes	
Self-testing	Yes, implemented but room to scale	No	Yes	
Index testing	Yes, implemented but room to scale	No	Yes	
PrEP	Yes, implemented but room to scale	No	Yes	
Scale-up of AGYW interventions	Yes, implemented but room to scale	No	Yes	
Dolutegravir-regimen change	Yes, only in pipeline	Yes (Zheng et al 2018)	Yes	✓
Differentiated care models- multi-month scripts and simplified lab testing algorithm for stable patients (facility-level)	Yes, partially implemented but room to scale	Yes (Forsythe, Lee, Dutta, Barker 2016; Baker et al 2017)	Yes	✓
Community-based support services for stable patients	Yes, partially implemented but room to scale	Yes (Forsythe et al 2018)	Yes	✓
Home-based ART	Yes, not implemented	No, actually costs more (MacPherson et al 2014)	No	

Annex 7. Calculation of savings from technical efficiencies

The breakdown for the baseline unit cost for ART is shown below with major cost components. The proposed technical efficiencies are then mapped to the specific unit cost component they affect.

Figure 7A-1. Baseline ART unit cost

	Unit cost (USD)	Relevant TE
Average cost of ART per person reached	**$205**	
ARVs	$98	DTG switch
Personnel	$36	
Lab services	$28	Full implementation of DSDM
Supporting services	$57	Community-based support services

Source: Tanzania Ministry of Health, Community Development, Gender, Elderly, and Children, U.S. Centers for Disease Control and Prevention, and ICF International. (2016a). The Cost of Comprehensive HIV Treatment in Tanzania. Dar es Salaam, Tanzania and Atlanta, GA (USA): U.S. Centers for Disease Control and Prevention; Forsythe, S., B. Lee, K. Tarimo, B. Silvan, M. Balampama, J. Chitty, and Sara Bowsky (2018). Efficiency Analysis of HIV Treatment Support Services at the Facility and the Community Levels. Washington, DC: Palladium, Health Policy Plus. [DRAFT]

Figure 7A-2. Savings from switch to DTG-based regimens for first-line ARVs

	Baseline	DTG Switch	Difference in costs
Adult average ARVs cost (USD)	**$103**	**$87**	**-$15.4**
Avg FL cost/year	$91	$75	-$15.4
% FL	96%	96%	
Avg SL cost/year	$354	$354[6]	
% SL	4%	4%	

Figure 7A-3. Savings from community-based support services

	Baseline	Community-based	Difference in costs
Average unit cost (USD) for supporting services	**$57.4**	**$37.6**	**-$19.8**
Facility-level	$35.6	$17.3	
Unit cost	$108.0	$108.0	-$19.4
Percentage	33%	16%	
Mix of facility-community	15.1	6.3	
Unit cost	$45.0	$45.0	-$9.0
Percentage	34%	14%	
Community-level	6.7	14.0	
Unit cost	$20.0	$20.0	+$7.4
Percentage	34%	70%	

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[6] Based on data from TACAIDS and UNAIDS (2016). Investment Case Reference Report

Figure 7A-4. Savings from full implementation of DSDM lab algorithms

	Baseline	Full DSDM	Difference in costs
Avg cost of lab tests (USD)	**$28.2**	**$14.0**	**-$14.2**
CD4	$3.8	$2.0	
Unit cost	$2.1	$2.1	
Stable patients[7] (70%)			
# of tests	2	--	
Utilization	93%	93%	
Unstable patients (15%)			-$1.8
# tests	2	2	
Utilization	80%	80%	
New patients (15%)			
# tests	2	2	
Utilization	80%	80%	
Hematology	$12.1	$2.1	
Unit cost	$10.9	$10.9	
Stable patients (70%)			
# of tests	2	--	
Utilization	60%	60%	
Unstable patients (15%)			-$10.0
# tests	2	1	
Utilization	53%	53%	
New patients (15%)			
# tests	1	1	
Utilization	72%	72%	
Clinical chemistry	$2.6	$0.3	
Unit cost	$3.2	$3.2	
Stable patients (70%)			
# of tests	2	--	
Utilization	47%	47%	
Unstable patients (15%)			-$2.4
# tests	2	1	
Utilization	7%	7%	
New patients (15%)			
# tests	2	1	
Utilization	47%	47%	
Viral load	$8.3	$8.3	
Unit cost	$21.9	$21.9	
Stable patients (70%)			
# of tests	1	1	
Utilization	63%	63%	
Unstable patients (15%)			-
# tests	1	1	
Utilization	63%	63%	
New patients (15%)			
# tests	1	1	
Utilization	6.7%	63%	
Equipment	$1.4	$1.4	-

---

[7] Assumed 70% of patients were stable (Forsythe et al 2016)

Annex 8. Differentiated Care Service Delivery Model guidelines

Figure 8A-1. DSDM recommendations for clinical visits and ARV prescriptions

	Previous SOC	**Tanzanian Guidelines (5th ed)**	**Tanzanian guidelines (6th edition)**	**Efficient Service Delivery (PEPFAR COP 2016)**	**CDC 2015 ART costing study assumption**
Clinical visits for new clients	13 visits per year	5 visits per year	5 visits per year	3 visits per year	9 visits per year
Clinical visits for stable, continuing clients	12 visits per year	4 visits per year	2 visits per year	2 visits per year	6 visits per year
Clinical visits for non-stable, clinical clients	12 visits per year	12 visits per year	12 visits per year	12 visits per year	12 visits per year
Refill visits (non-clinical) for stable, continuing clients	---	8 visits per year	6 visits per year	2 visits per year	------ (clinical and prescription visits not different)

Figure 8A-2. DSDM recommendations for lab testing

Annual number of tests per patient	**Tanzanian guidelines (6th ed)**			**Efficient Service Delivery (PEPFAR COP 2016)**			**CDC 2015 ART costing study assumption**		
	New patients	**Stable patients**	**Non-stable patients**	**New patients**	**Stable patients**	**Non-stable patients**	**New patients**	**Stable patients**	**Non-stable patients**
CD4	2 tests	--	2 tests	2 tests	--	2 tests	2 tests (80%)	2 tests (93%)	2 tests (80%)
Creatinine (for TDF containing regimens)	2 tests for 63%	2 tests for 63%	2 tests for 63%	1 test for 63%	1 test for 63%	1 test for 63%			
Clinical chemistry				1 test	--	1 test	2 tests (46.7%)	2 tests (46.7%)	2 tests (6.7%)
Hb (for AZT containing regimens)	2 tests for 36%	2 tests for 36%	2 tests for 36%	1 test for 36%	1 test for 36%	1 test for 36%			
Hematology				1 test	--	1 test	1 test (72%)	2 tests (60%)	2 tests (53.33%)
Viral load	2 tests	1 test	1 test	1 test	1 test	1 test	1 test (6.7%)	1 test (6.7%)	1 test (6.7%)

Annex 9. Calculation of feasible domestic resource mobilization

		Increment	Target	2015	2016	2017	2018 (P)	2019 (P)	2020 (P)	2021 (P)	2022 (P)	2023 (P)	2024 (P)	2025 (P)	2026 (P)	2027 (P)	2028 (P)	2029 (P)	2030 (P)
Gross domestic product (USD billion)				45.6	47.7	52.1	55.6	60.3	65.5	70.1	74.9	79.8	84.8	90.0	95.2	100.5	105.8	111.1	116.5
Real GDP growth (percent)	Assume growth starts to slow by a quarter % per annum after 2020	-0.25%		7.0%	7.0%	6.0%	5.8%	6.6%	7.3%	7.1%	6.8%	6.6%	6.3%	6.1%	5.8%	5.6%	5.3%	5.1%	4.8%
General government total expenditure as a % of GDP	Assume remains constant after 2023			17.8%	17.7%	17.3%	18.8%	20.1%	19.9%	19.3%	18.9%	18.9%	18.9%	18.9%	18.9%	18.9%	18.9%	18.9%	18.9%
General government expenditure (USD billion)				8.1	8.4	9.0	10.5	12.1	13.0	13.5	14.1	15.1	16.1	17.0	18.0	19.0	20.0	21.0	22.0
Domestic General Government Health Expenditure (GGHE-D) as % General Government Expenditure (GGE)	Assume 0.5% increase until threshold is achieved	0.25%	11%	7.0%	10.0%	10.25%	10.50%	10.75%	11.00%	11.00%	11.00%	11.00%	11.00%	11.00%	11.00%	11.00%	11.00%	11.00%	11.00%
Domestic General Government Health Expenditure (GGHE-D) (USD mil)				595.7	801.4	923.5	1,097.8	1,302.7	1,430.6	1,487.4	1,556.0	1,661.2	1,765.9	1,872.7	1,981.3	2,091.3	2,202.1	2,313.3	2,424.4
Domestic General Government Health Expenditure (GGHE-D) (USD mil) on **HIV**	Adopted the GF funding landscape numbers for first couple of years			36.8	49.8	52.3	54.9	57.6	66.9	73.2	80.5	90.1	100.2	110.9	122.3	134.4	147.0	160.2	173.9
Domestic General Government Health Expenditure (GGHE-D) (USD mil) on **HIV** as % of GGHE-D	Assume we can advocate to get to where expenditure was before as a % - increase at 0.5% per annum starting 2020 budget year	0.25%	7.0%	6.2%	6.2%	5.7%	5.0%	4.4%	4.7%	4.9%	5.2%	5.4%	5.7%	5.9%	6.2%	6.4%	6.7%	6.9%	7.2%
Total increase in domestic spending (USD mil)					13.01	2.49	2.61	2.74	9.23	6.37	7.27	9.60	10.09	10.74	11.39	12.02	12.63	13.21	13.75

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