Estimating the cost and cost savings from decentralized distribution of antiretroviral therapy

Decentralized Drug Distribution (DDD) Learning Collaborative

December 10, 2020

PEPFAR

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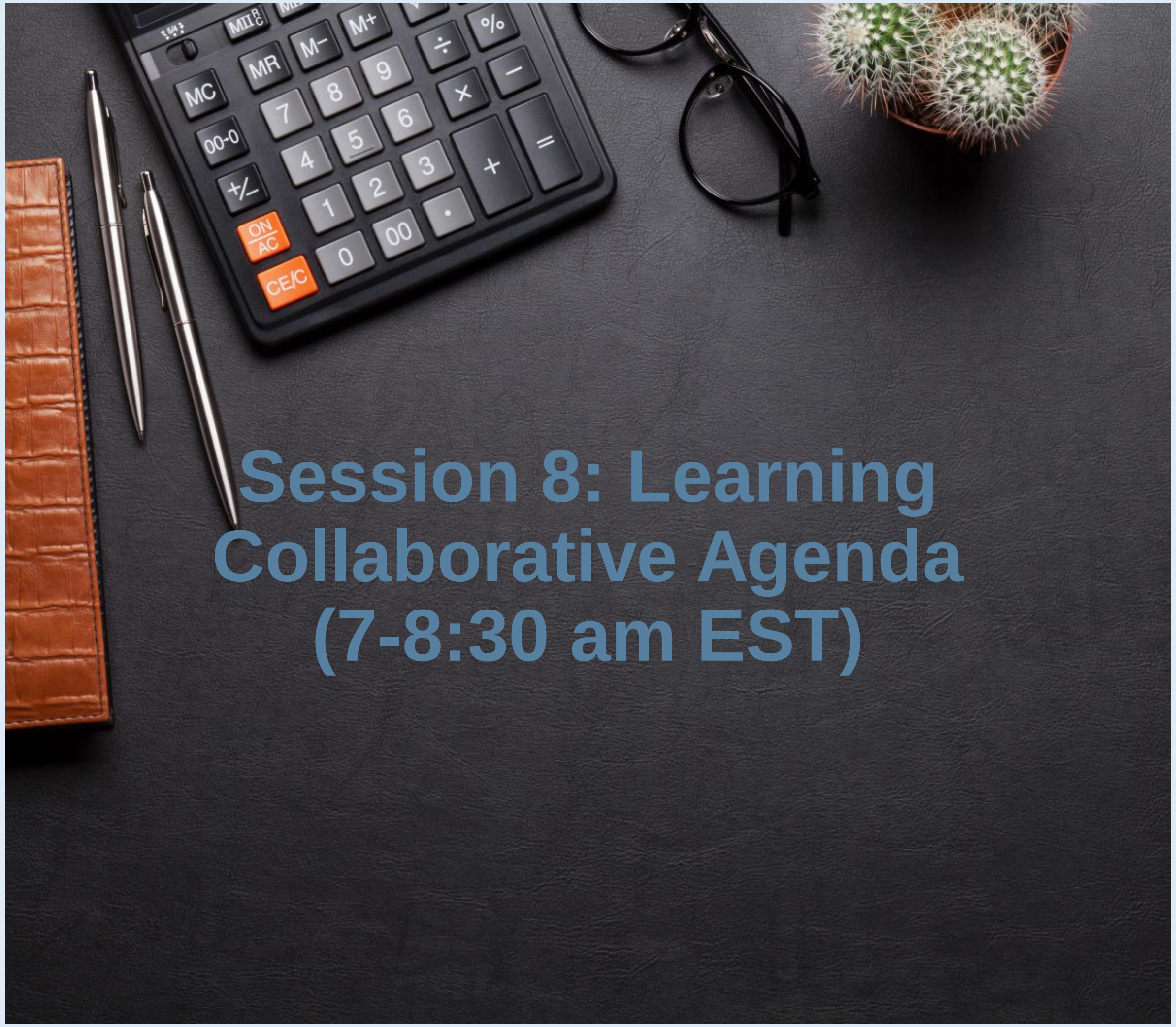
EpiC
Meeting Targets and Maintaining Epidemic Control

Session 8: Learning Collaborative Agenda (7-8:30 am EST)



- **Estimating potential impact of DDD models**
  Catherine Barker Cantelmo, Technical Advisor, Health Financing, Palladium

- **Using Program Data to Determine Scale up Plans for DDD and Viral Load testing in the private sector in Botswana**
  Mula Mpofu, Strategic Information Advisor, FHI 360, Botswana

- **Preliminary High-Level Estimates of Resources Required to Support CDD in Eswatini**
  Rick Homan, Health Economist, FHI 360, Durham NC

- **Costs and Outcomes of DSD Models for HIV Treatment in Sub-Saharan Africa**
  Sydney Rosen, Research Professor, Boston University School of Public Health

- **Q&A**
  Hannah Marqusee, Health Economics Advisor, USAID
  Facilitator

SPEAKERS

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Health Economist, FHI 360,

Sydney Rosen

Research Professor, Boston University
School of Public Health

FACILITATOR

Hannah Marqusee

Health Economics Advisor, USAID
Facilitator

Cost savings are achievable through DSD and DDD models, yet more analysis is needed across variables

Patient costs

- Lost wages
- Transport
- Substitute labor
- Health benefits

Facility Costs

- Healthcare worker time
- Commodity costs
- Infrastructure
- Resources for other priority health areas

Supply Chain Cost

- Costs incurred by supply chain and facility partners
- Transport from district warehouse
- Transport to PuP
- Drug costs

Adherence Costs

- Costs of supporting stable versus non-stable patients
- Community track and trace programs
- Second line treatments

Socioeconomic Cost

- Improved worker productivity
- Increase in time dedicated to community and family

Estimating potential impact of DDD models

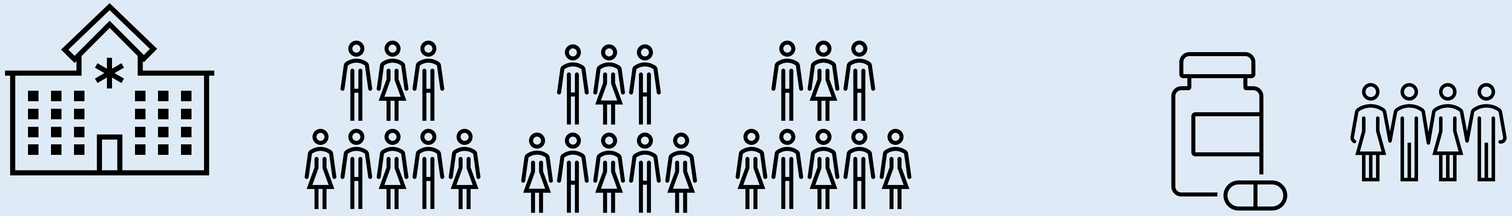
Decentralized Drug Distribution (DDD) Learning Collaborative

Catherine Barker Cantelmo

Technical Advisor, Health Financing, Palladium

How can DDD models improve outcomes and save costs?

Before



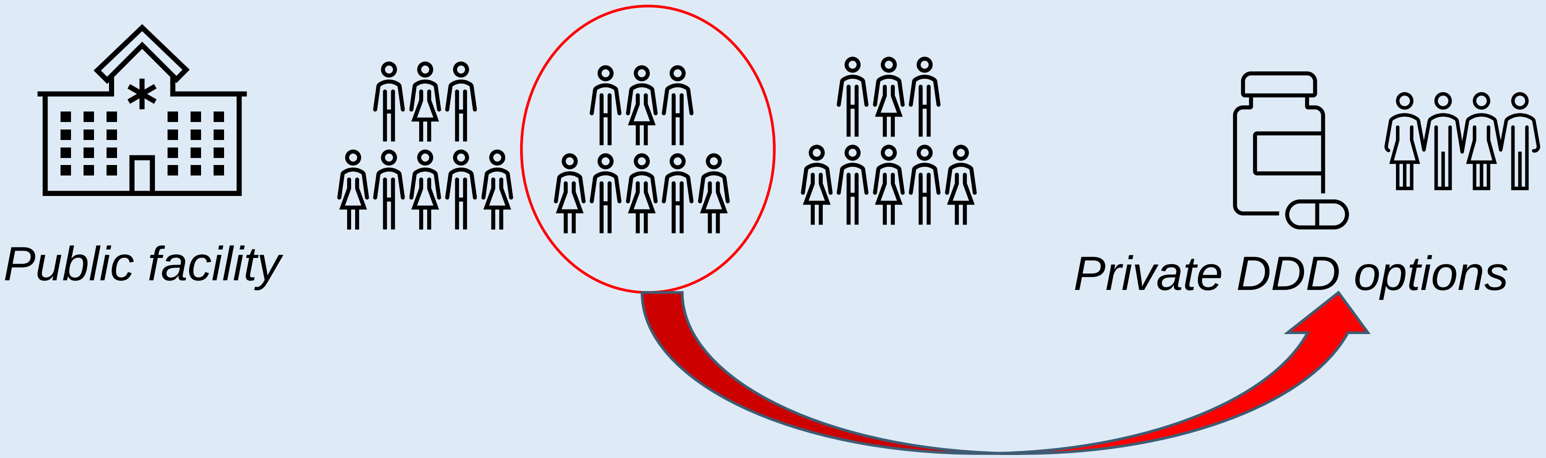
Public facility

Private DDD options

Characterized by:

- Vast majority of patients visit public facilities for HIV treatment and ARV dispensing and receive these services free of charge, regardless of ability or willingness to pay for the service
- Government and donors subsidize service and commodity costs for these patients
- Overburdened healthcare system and possibly inconvenienced clients

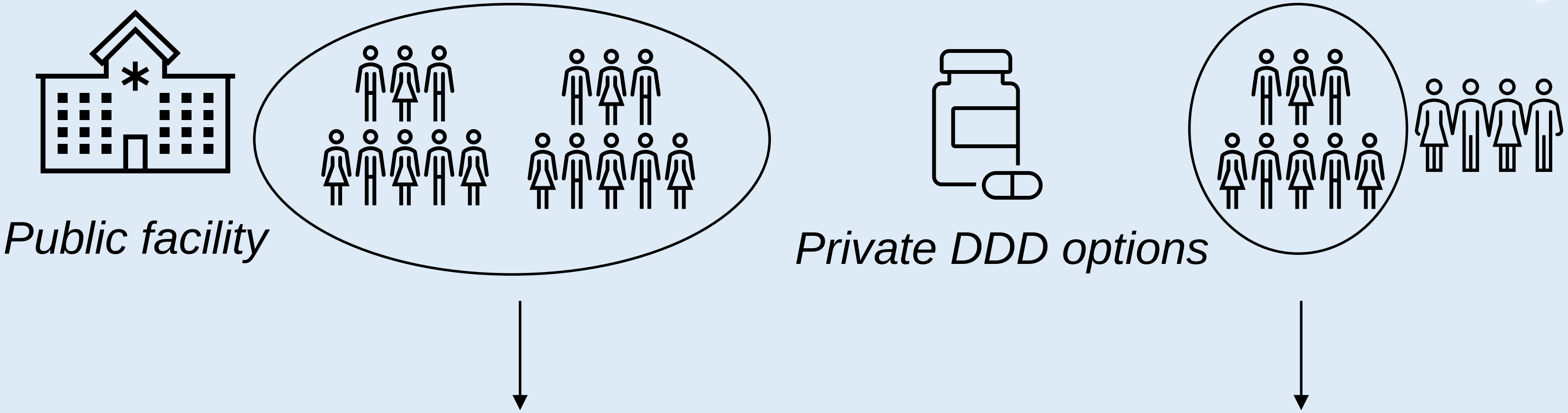
How can DDD models improve outcomes and save costs?



What if these patients were offered alternative options (e.g., private pharmacy pick-up) that were more convenient to them, and they were willing and able to pay for part of the cost of their care visit or ARVs?

How can DDD models improve outcomes and save costs?

After



- Clients still in need of subsidized care receive it
- Less overwhelmed public health system may allow for improved quality in care
- Retention in care, viral suppression, and survival may improve for these clients, also leading to reduced transmission

- These clients may have reduced transportation and opportunity costs for ART
- Co-financing in private sector reduces costs to public sector funders
- Retention in care, viral suppression, and survival may improve for these clients, also leading to reduced transmission

How do we quantify these potential benefits?

Dynamic relationship

Determine market potential → Project numbers on ART under status quo vs. DDD scale-up scenarios → Estimate number of new infections and AIDS-related deaths → Calculate total costs to funders by scenario → Calculate total costs to patients by scenario

- Eligibility
- Access to model
- Ability to pay
- Willingness to switch

New modelling tool available

Palladium developed an Excel-based model to estimate the potential impact from scaling-up:

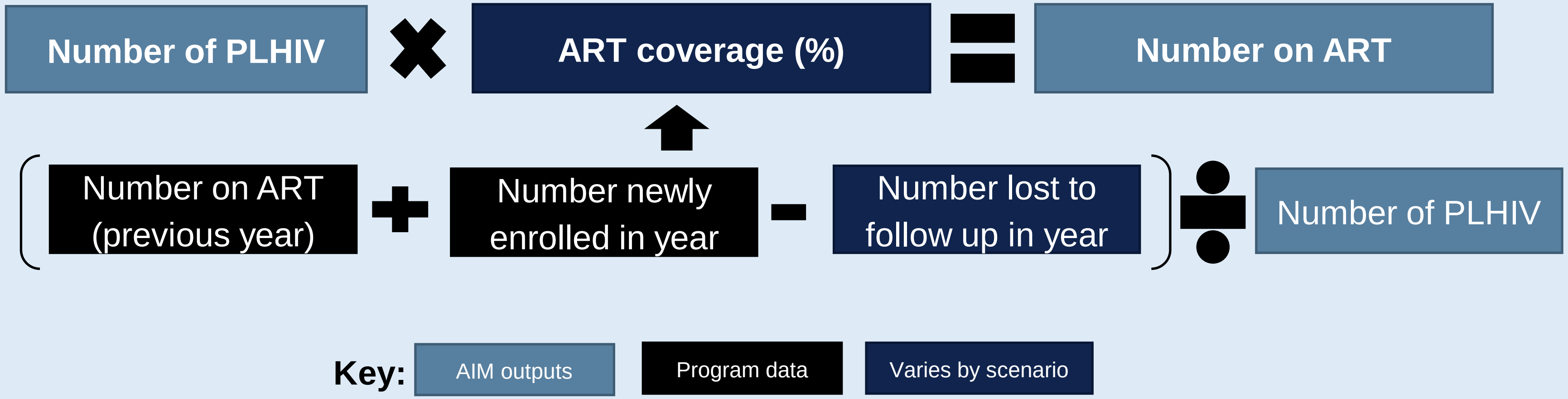
- **Community pharmacy models** –patients pay or contribute to pick up ARV drugs paid for and provided by the government or donors
- **Private hospital model** –patients pay or contribute to comprehensive care but get free ARVs subsidized by the government or donors
- **Automated models** – patients contribute to ARV pick-up through pharmacy dispensing units, central dispensing units and lockers with ARV drugs *(user defines which model applies)*

Key model outputs per country, by scenario and year:

- Number and proportion of ART patients estimated to participate in each DDD model
- Number of new HIV infections
- Number of AIDS-related deaths
- Costs and cost savings to the funder (PEPFAR and the government)
- Costs and cost savings to the patient

Epidemiological inputs and outputs

- We build off countries' official AIM files for projections
- Number of PLHIV on ART is an important input for determining market size, and an important output for determining epidemiological impacts
- Number of AIDS-related deaths and new infections depend on how many people are on ART, which can vary by scenario based on how effective DDMs are at improving retention in care



Determining market size

Factor	How model handles factor
Eligibility	• First-line ART patients who are stable on treatment (using viral suppression as proxy) and 18 years of age or older
Access to model	• User defines regions/districts where model is available • If multiple models available, model assumes equal division of market share across models as default (this can be changed/defined by user instead)
Ability to pay	• Based on user-defined threshold for percentage of annual HH income that can be spent on ART • Requires entering information on price to patient, average HH income by quintile, and distribution of PLHIV by quintile
Willingness to switch	• Model assumes just a proportion of those eligible for the model with access and ability to pay will actually switch • Due to lack of data/evidence, default is 50%. User can change this if data are available and we can run sensitivity analysis on this

Estimating economic impacts

- **Cost savings to patients**: Subtract direct and indirect costs borne by patients (including user fees paid, transportation costs, and estimates of lost income) of DDD model scale-up scenario from baseline scenario.

- **Cost savings to PEPFAR/the government**: Subtract total ART costs to PEPFAR/the government under the DDD model scenario from the baseline scenario (see below)

(ART unit cost of DDD model ✖ Number of clients participating in DDD model) ✚ DDD model start-up or scale-up capital costs = Total cost of DDD model

Cost categories:

- HRH
- Facility overhead
- ARVs
- Laboratory commodities

How can this model be used?

- Advocacy:
  - Showing medium-term benefits and cost savings for DDD models, even if they require upfront investment
- Decision-making:
  - Selecting geographical locations for DDD model piloting and scale-up
  - Determining potential effects of changing fees to clients under each DDD model

Illustrative example from Zimbabwe

Key model assumptions and scenarios

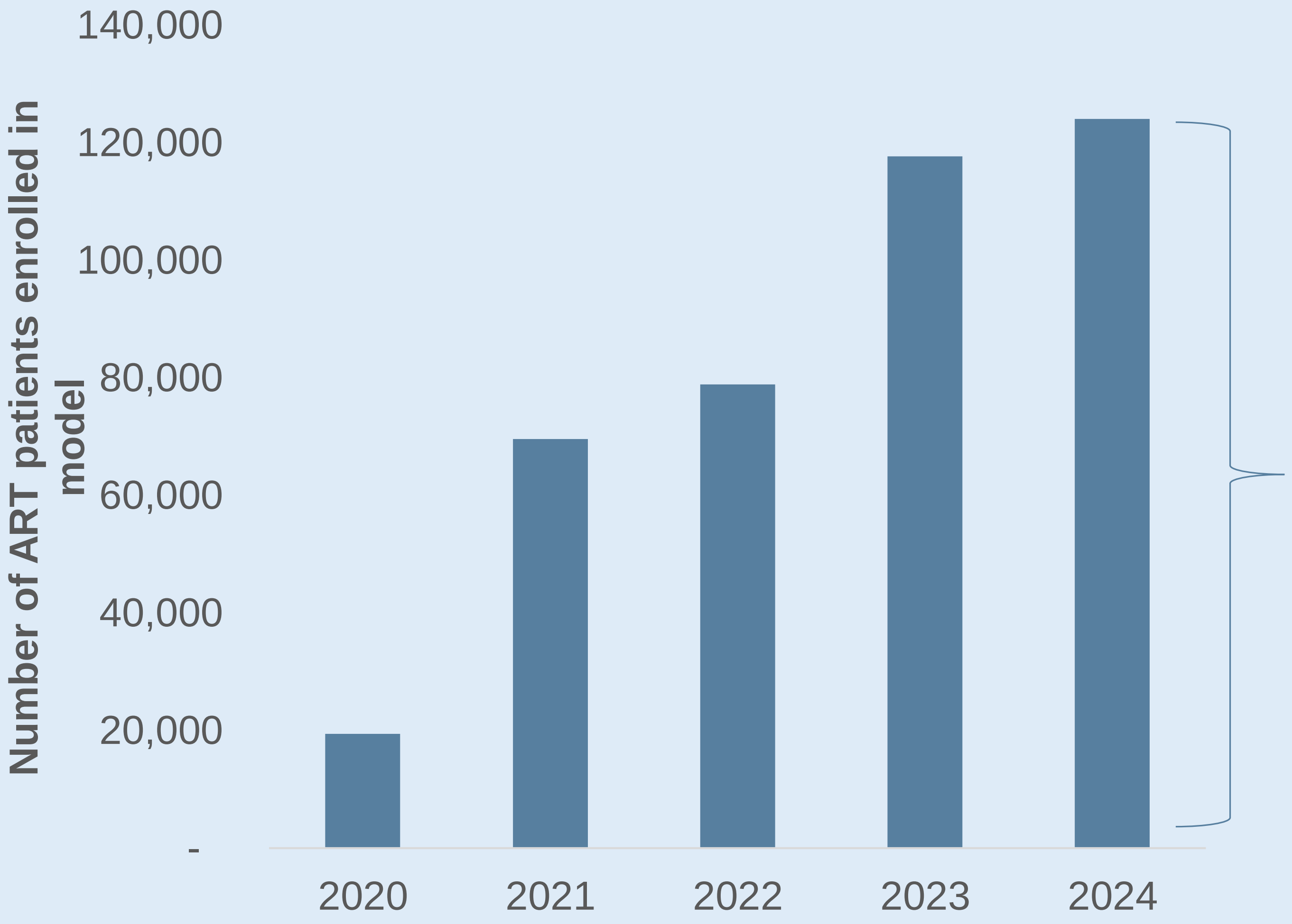
Key assumptions:

- Private pharmacy ART patients will pay $1 dispensing fee per visit
- By 2024, half of ART patients will receive 3-month scripts and half will receive 6-month scripts
- Adults ages 18+ on first-line treatment and virally suppressed are eligible to participate in the model
- Just over half of ART patients (59%) have the ability to pay for the model given the price and household income
- 50% of patients with access to the model and ability to pay will choose to enroll in the model
- Underlying epidemiological estimates come from AIM in Spectrum
- Cost estimates based on literature review

Scenarios:

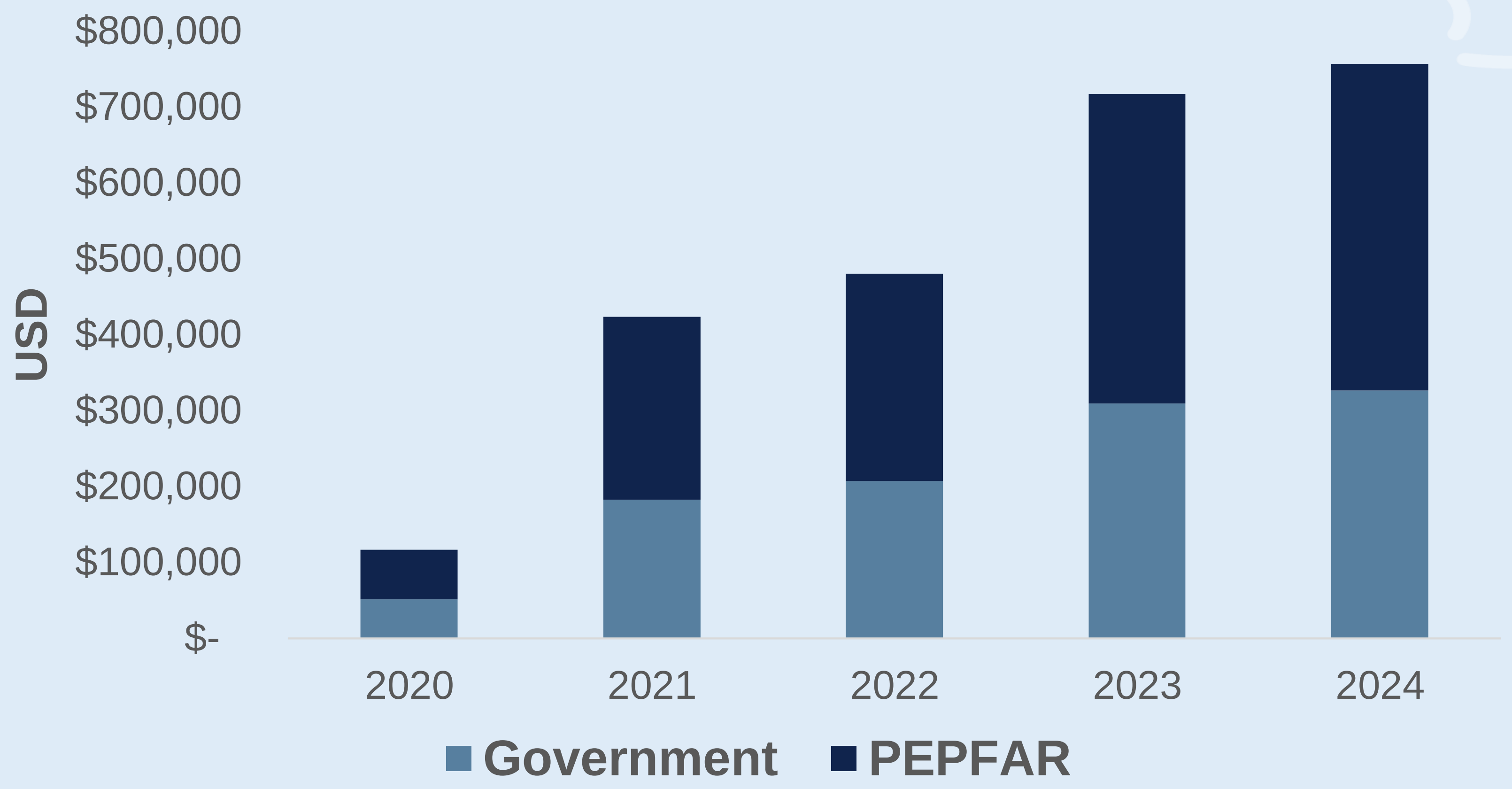
- **Baseline scenario** – Assumes no patients will enroll in a private pharmacy model from 2020-2024.
- **DD scenario** – Assumes gradual scale-up of private pharmacy models in Bulawayo, Harare, Kwekwe, Gweru, and Mangwe

Potential market size for participation in a private pharmacy model



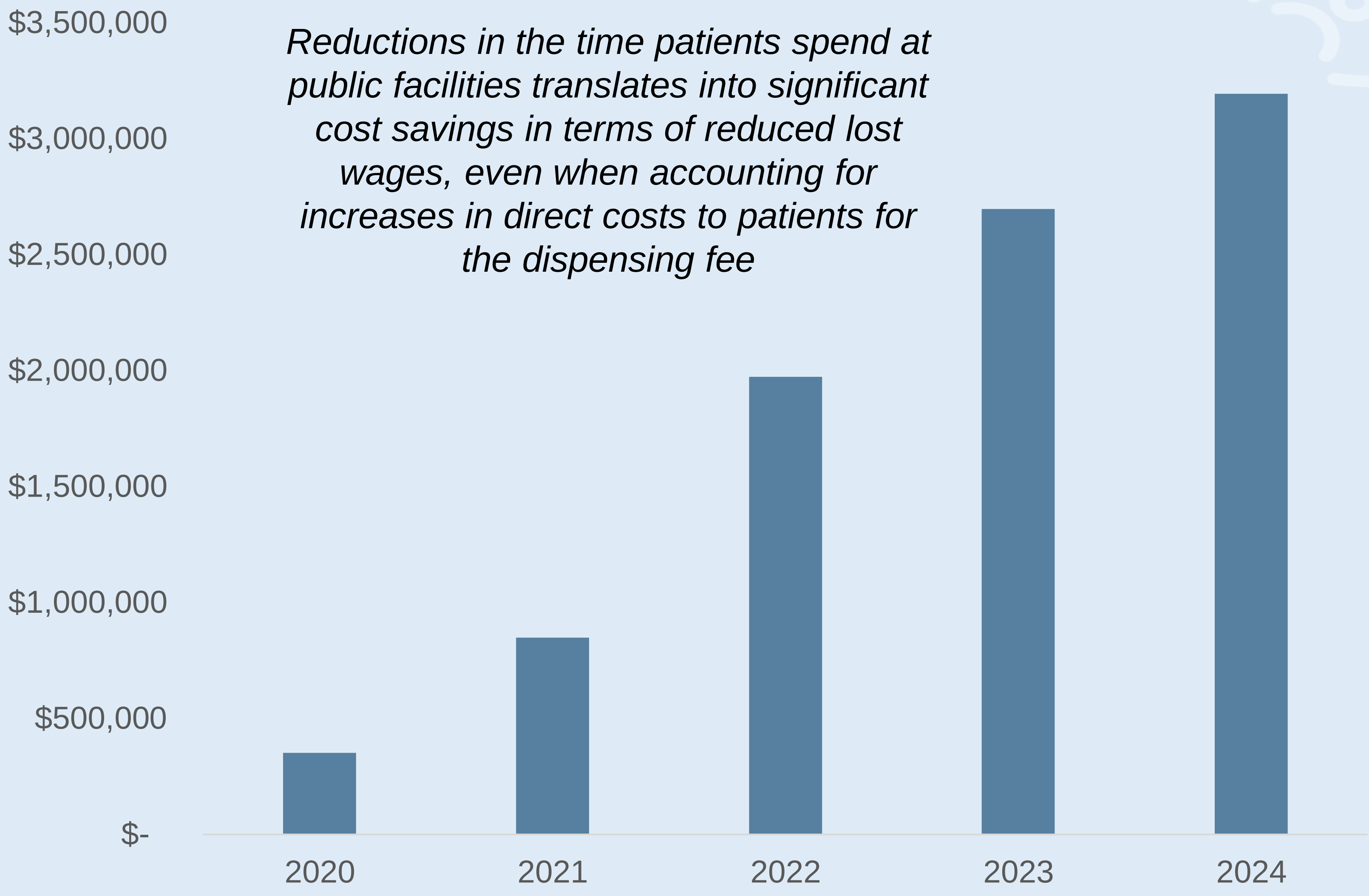
By 2024, approximately **10%** of all adults ages 18+ on ART could be enrolled in the private pharmacy model

Cost savings to funders



- Cost savings are from reduced public facility HRH and overhead needed for ART, reduced patient tracking costs, and cost-sharing with ART patients under the private pharmacy scale-up scenario
- Savings are relatively small as the model assumes that more people will be on ART under the private pharmacy scale-up scenario

Cost savings to patients



Using Program Data to Determine Scale up Plans for DDD and Viral Load testing in the private sector in Botswana

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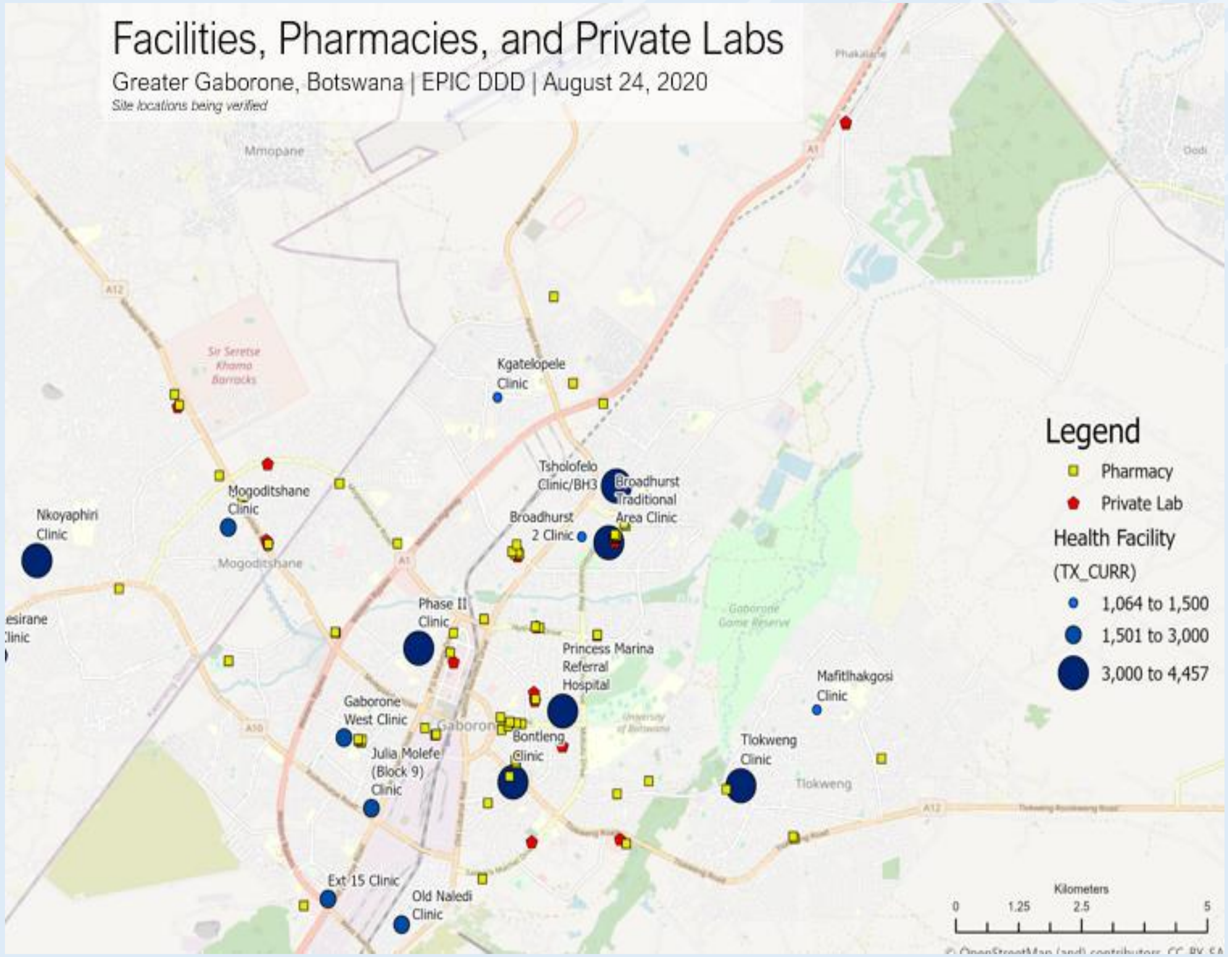
EpiC Meeting Targets and Maintaining Epidemic Control

Outline

- Scale up of health interventions-the principles
- DDD models in Botswana
- Using program data to estimate cost of implementing DDD and viral load testing in the private sector in Botswana.



Fundamentals of scale-up – the framework

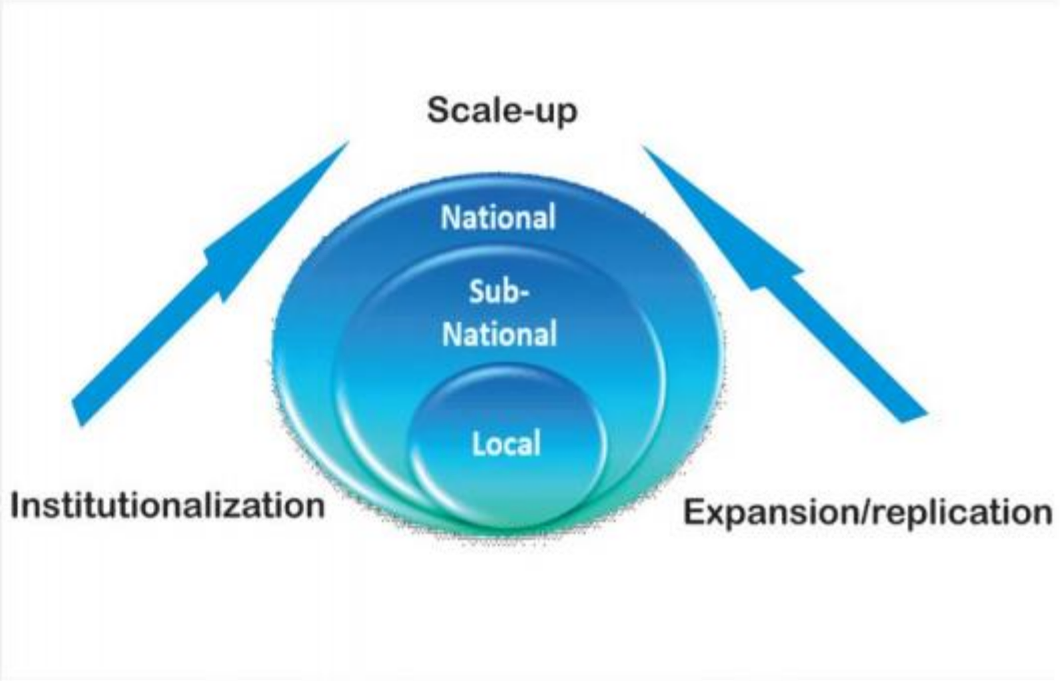


Figure 1. Successful scale-up involves institutionalizing the practice and expanding or replicating it.

- DDD Models are:
  - Replicable
    - Another version of PPP
    - Currently being implemented in other countries
  - Institutionalization
    - Botswana government has a history of sub-contracting private service providers
    - Currently partnering with private pharmacies on distribution of drugs for NCDs

Source: MEASURE Evaluation

Requisites for scale-up?

- Do we have a better understanding of what it takes to scale up the main elements of the practice?
- Do we have essential information for continued replication and sustainability?
- How can we more systematically plan for and manage scale-up beyond routine program management and implementation?
- With changing environments, are appropriate adaptations being made during scale-up?
- Where do we need to put more attention?

DDD+ models for Botswana

	Private pharmacies	Private Clinics	Post Office (Home deliveries, digital lockers & automated dispensing machines)	VL through the private pharmacy
Clients	All patients on ART	All patients on ART	All patients on ART	All patients on ART
Services	ART refills, PrEP, CTX, adherence support	Clinic care, ART refills, Viral load, PrEP, TPT,	ART refills, PrEP, TPT,	Viral load

- The question the Botswana government is asking is which of these models should we scale up
- What should be the considerations for scale up?
  - Effectiveness? Cost? Cost-effectiveness

Justification for Botswana

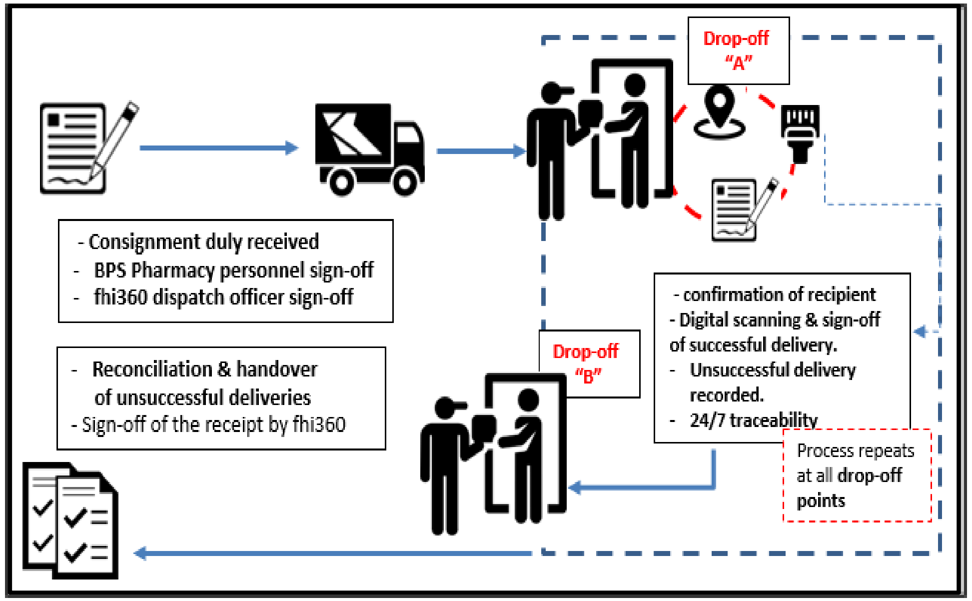
- Need to accelerate progress towards 95-95-95:
  - ✓ ART coverage
  - ✓ Retention rates
- Growing number of stable patients enrolled in DSD models
  - ✓ Overcrowded facilities and long waiting time
  - ✓ Existing models do not meet needs of all patients for example:
    - Men -72% ART coverage
    - Young people- 53% men and 78% women 15-24 yrs. old
    - People who fear stigma- KPs, PLHIV accessing care in private sector
- High viral suppression among patients (>90) reflect good adherence – hence need to shift to patient centered delivery methods to sustain this

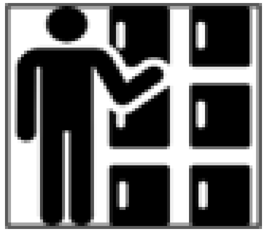
Private Sector Offer An Additional DSD "CHOICE"

- Opportunities in Botswana:
  - ✓ There are **350** private clinics and about 680 general practitioners who are available, even on weekends and after hours.
    - Over **80** private pharmacies and private clinics in Greater Gaborone
  - ✓ Pharmacies already dispense other chronic diseases medicines, and many dispense ARVs
    - Convenience (open 7am-8pm), confidentiality and quality perception
    - Provide greater choice near residence or work
  - ✓ Some patients are <u>able</u> and <u>willing</u> to pay

The NCD programme is already using Private pharmacies to bring medications closer to the people

Engaging the Private Sector in Botswana-Progress



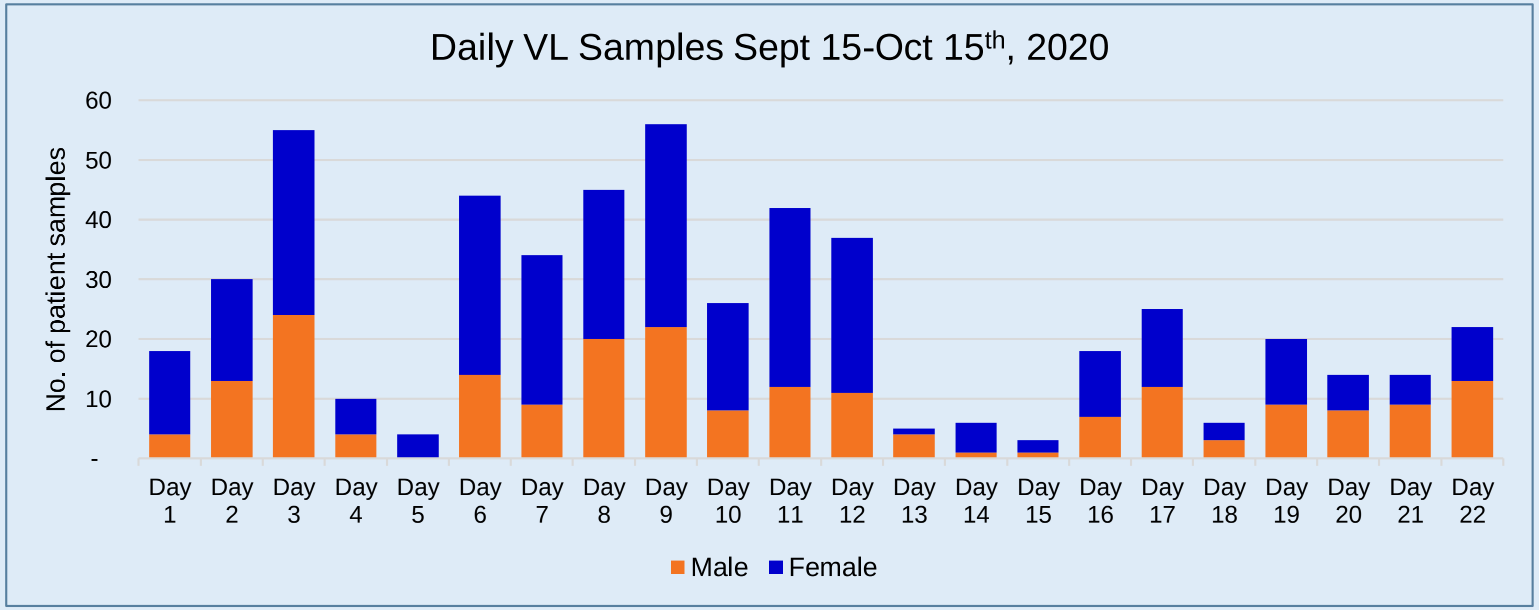


For Smart Locker

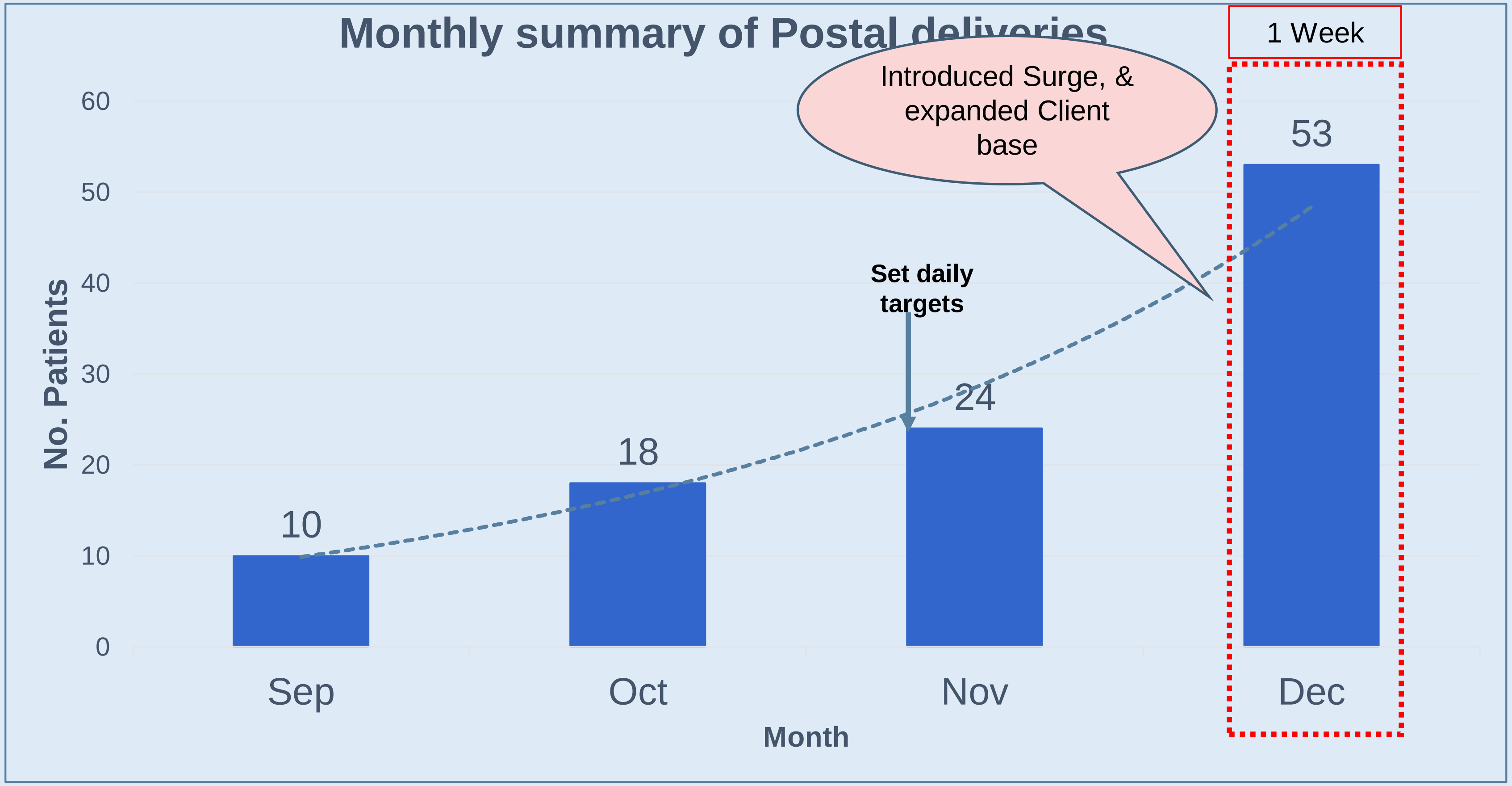
Customer notification with locker number and access code. No human contact and 24hr Access

Botswana Post has delivered ARVs to **105** client homes at a cost of ~$5 per delivery (expected dispensing fee $4.5-9 for private pharmacy).
The uptake of home delivery is around 35% of those eligible for DDD models.

- Signed contract with private lab to provide VL testing
  - Turn-around time of 4-8 hours vs. 7 days to 6 weeks before
  - Cheaper cost in private ~US$22; in public, VL reagents cost US$22 and hourly staff time is US$12
- Signed a service level agreement with the Botswana Postal Services
  - Home deliveries and smart lockers
  - Trained nurses on E-waybill, packaging, and tracking deliveries in real time



Home Deliveries Summary



- Currently being implemented at Tebelopele Wellness Center (TWCs) under the two projects EPIC & APC

Using program data to plan for DDD scale-up in Botswana

STEPS

1 **PRIORITISATION**

Prioritize geographic locations (Districts)

2 **DETERMINE PROGRAMATIC GAPS**

VL Access
ART Coverage
Retention

3 **DETERMINE TARGETS**

VL Access
ART Coverage
Retention

District Prioritization – Top 10 high PLHIV

	2019 HIV Estimates					
District Rank	District	PLHIV	PLHIV 18+	PLHIV on On ART	On ART 18+	New Infections 18+
1	Kweneng East District	56,035	54,402	21,056	20,777	1,361
2	Gaborone District	46,621	45,262	60,483	59,682	1,132
3	Mahalapye District	30,458	29,570	21,483	21,199	740
4	Francistown District	25,900	25,145	35,341	34,873	629
5	Bobirwa District	21,287	20,666	10,487	10,348	517
6	Tutume District	17,732	17,215	13,327	13,151	431
7	Ngamiland District	16,634	16,150	16,331	16,115	404
8	Kgatleng District	16,244	15,771	11,744	11,589	394
9	South East District	15,174	14,732	5,908	5,830	369
10	Boteti District	13,866	13,462	10,962	10,817	337
11	Southern District	13,184	12,800	8,152	8,044	320
12	Palapye District	12,740	12,369	15,917	15,706	309
13	North East District	12,427	12,065	6,855	6,764	302
14	Serowe District	11,528	11,192	15,216	15,014	280
15	Selibe Phikwe District	10,494	10,189	9,397	9,272	255
16	Okavango District	10,268	9,968	8,201	8,092	249
17	Goodhope District	8,141	7,903	5,026	4,960	198
18	Moshupa District	7,618	7,396	3,953	3,900	185
19	Kweneng West District	6,898	6,697	5,313	5,243	168
20	Chobe District	6,047	5,870	4,415	4,357	147
21	Lobatse District	4,658	4,522	7,191	7,096	113
22	Gantsi District	3,757	3,647	3,245	3,202	91
23	Jwaneng District	3,637	3,531	4,590	4,529	88
24	Kgalagadi South District	3,269	3,174	3,535	3,489	79
25	Kgalagadi North District	3,181	3,088	2,538	2,505	77
26	Mabutsane District	2,564	2,489	1,691	1,668	62
27	Charleshill District	1,527	1,482	1,491	1,471	37
	Total (National)	**381,889**	**370,757**	**313,850**	**309,692**	**9,274**

- 27 Health Districts
  - 82% ART coverage nationally
  - Urban districts have more patients on ART than estimated PLHIV as they provide ART services to neighboring rural districts.

Botswana-Current ART and VL Gaps

	Indicator	Top 10 high volume districts	Rest of the districts	National
ART Coverage				
	PLHIV	259,952	121,937	381,889
	ON ART	207,123	106,727	313,850
	ART Coverage	**79.7%**	**87.5%**	**82.2%**
	ART Gap	52,829	15,210	68,039
Viral load access				
	On ART	207,123	106,727	313,850
	With Viral load	180,727	93,075	273,802
	Viral load Coverage	**87.3%**	**87.2%**	**87.2%**
	VL Access Gap	26,397	13,652	40,048

- The top 10 high volume districts in Botswana have the lowest ART coverage at **79.8%** which is lower than rest of the low-tier districts (**87,5%**). The top 10 districts account for 78% of the treatment gap.
- Viral load access is consistent across districts at 87%, with viral suppression rates also high at 96%. However, the top 10 high volume districts account for **66%** of the viral load gap- in absolute numbers.

PLHIV and ART Projections- top ten districts

Indicator	*Past trends*				*Projections*				
	2016	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**
Number of people living with HIV (All ages)	253,114	254,201	255,583	259,952	261,461	262,409	263,065	263,473	263,675
Number of adults ages 18+ living with HIV	242,465	243,779	245,480	252,375	254,734	256,446	257,874	259,040	259,932
Number of people on ART (all ages)	180,200	171,801	179,161	207,123	227,536	234,510	241,129	247,430	248,082
Number of adults ages 18+ on ART	175,289	168,176	176,065	204,379	224,450	231,311	237,948	244,372	245,223
Number of new patients on ART (all ages)	16,774	17,972	12,975	12,121	10,222	8,326	6,431	4,535	2,640

- The top 10 high volume districts are largely urban
- Account for:
  - **68%** of PLHIV and New Infections
  - **66 %** of patients on ART

Source: MOH and UNAIDS

Estimated number on treatment- Top Ten Districts

Baseline scenario		2020	2021	2022	2023	2024
PLHIV (18+)		254,734	256,446	257,874	259,040	259,932
DD model-eligible patients		171,697	186,783	190,721	194,480	198,291
Anticipated ART enrollment	Public	203,240	221,098	225,759	230,209	234,720
	DDM	0	0	0	0	0
	Total	**203,240**	**221,098**	**225,759**	**230,209**	**234,720**
	ART Coverage	**79.8%**	**86.2%**	**87.5%**	**88.9%**	**90.3%**
DD scale-up scenario		**2020**	**2021**	**2022**	**2023**	**2024**
DD model-eligible patients		172,472	187,456	191,409	195,182	199,006
Anticipated ART enrollment	Public	162,858	161,015	130,869	133,448	136,063
	DDM	41,298	60,879	95,705	97,591	99,503
	Total	**204,157**	**221,894**	**226,573**	**231,039**	**235,566**
	ART Coverage	**80.6%**	**86.9%**	**88.3%**	**89.6%**	**91.1%**

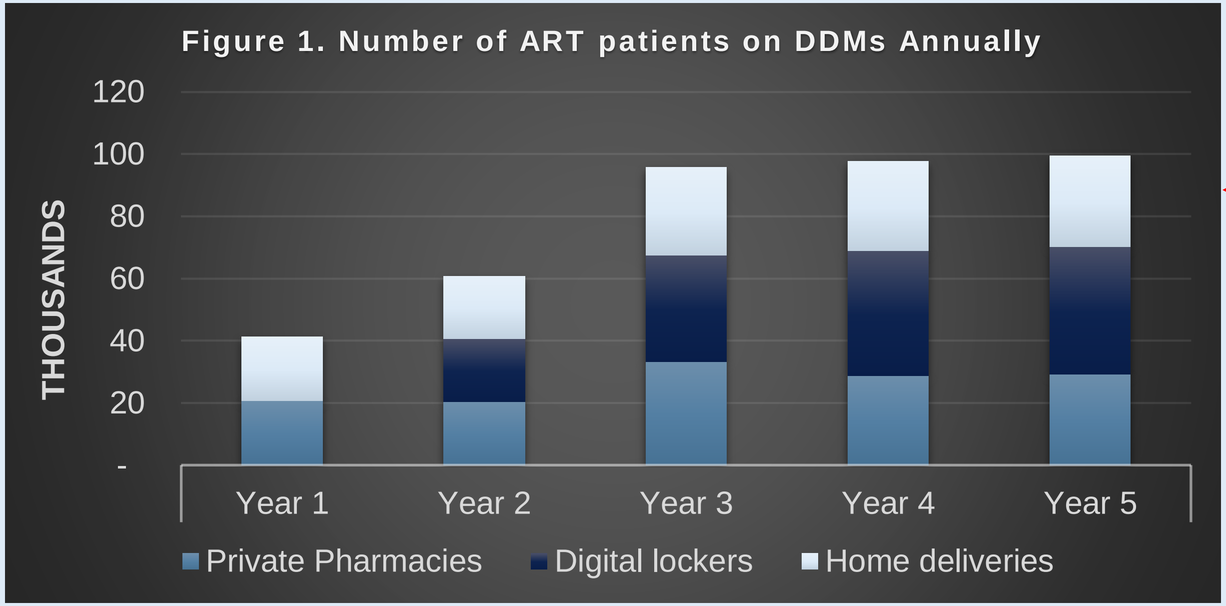


Figure 1. Number of ART patients on DDMs Annually

- Because of high retention- estimated at 95%, there will be minimal differences in patients on treatment between baseline and DDD scenarios
- There will be three DDD models
- Retention rates under DDD models are expected to be between 96-98% *(based on community pharmacy ART program in Uganda)*
- Other assumptions:
  - DDDM roll-out will be in a phased approach- starting with four districts in year 1(2020); then six districts in 2021 before reaching all districts in 2022.
  - Private pharmacy model and home deliveries will happen in 2020 and digital lockers coming on board in 2021
  - Acceptability of the three models will be the same

ART Coverage- Baseline Vs DDDM

Baseline Scenario	2020	2021	2022	2023	2024
Baseline Scenario					
Adults HIV patients on ART	203,240	221,098	225,759	230,209	234,720
ART coverage (%)	79.8%	86.2%	87.5%	88.9%	90.3%
ART patients LTFU	10,162	11,055	11,288	11,510	11,736
New HIV infections	6,098	5,325	4,958	4,729	4,461
AIDS-related deaths	3,343	3,049	2,889	2,815	2,652
DD Scale-up Scenario	**2020**	**2021**	**2022**	**2023**	**2024**
Adults HIV patients on ART	204,157	221,894	226,573	231,039	235,566
ART coverage (%)	80.2%	86.7%	88.3%	89.6%	91.0%
ART patients LTFU	9,175	9,877	9,425	9,715	9,905
New HIV infections	6,071	5,305	4,941	4,712	4,445
AIDS-related deaths	3,328	3,038	2,878	2,805	2,642

- There will be marginal differences in ART coverages between baseline and DDDM model
  - However, lower expected LFTU under DDDMs is expected to translate to:
    - Lower new infections (97 less) and
    - Lower deaths (57 less) over the five-year period.

Cost of Implementation- Baseline vs. DDD Scale-Up

	2020	2021	2022	2023	2024
Government of Botswana Cost savings					
Baseline costs	$15,720,073	$17,101,342	$17,461,893	$17,806,071	$18,154,967
DDM costs	$15,488,225	$16,554,740	$16,552,905	$16,863,385	$17,193,809
Cost Savings	$231,847	$546,602	$908,988	$942,687	$961,159
PEPFAR Botswana Cost Savings					
Baseline costs	$3,614,616	$3,932,220	$4,015,123	$4,094,263	$4,174,487
DDM costs	$3,374,010	$3,500,565	$3,327,886	$3,381,942	$3,448,208
Cost Savings	$240,606	$431,655	$687,237	$712,321	$726,279
Total Response cost savings					
Total Savings	**$472,453**	**$978,257**	**$1,596,225**	**$1,655,008**	**$1,687,437**
BWP savings equivalent	5,385,964	11,152,130	18,196,965	18,867,091	19,236,782
% Savings	2.44%	4.65%	7.43%	7.56%	7.56%

- The Botswana Government and its partners are expected to save $0.47 million in year one if DDD is scaled up and reach 41,298 patients.
- **2.4%** savings are largely from staff time saving and facility overhead.

Cost savings to the patient (USD)	2020	2021	2022	2023	2024
Total savings – (wages lost and transport)	847,377	715,914	652,907	563,626	467,735
Total savings – Transport only	264,690	287,997	318,762	346,653	374,449

Patient cost savings

Under DDD all costs for dispensing will be paid by the Government of Botswana and its partners.

Assumptions

Total cost per patient per year on ART (USD)	Public sector	PPM	DLM	HDM
Human resources for health	$ 20	$ 12	$ 12	$ 20
Facility overhead	$ 10	$ 8	$ 5	$ 10
ARVs	$ 67	$ 67	$ 67	$ 67
Laboratory diagnostics	$ 22	$ 22	$ 22	$ 22

Funding source	Government	PEPFAR	Global Fund	Private
Human resources for health	63%	30%	7%	0%
Facility overhead	63%	30%	7%	0%
ARVs	87%	13%	0%	0%
Laboratory diagnostics	100%	0%	0%	0%
Capital start-up/scale-up costs	63%	30%	7%	0%
LTFU activities	63%	30%	7%	0%

PPP_VL Costs

Baseline Scenario	2020	2021	2022	2023	2024
ART patients (18+)	203,240	221,098	225,759	230,209	234,720
Public facility VL	176,819	192,355	196,411	200,282	204,206
PPP-VL	0	0	0	0	0
Total VLs	176,819	192,355	196,411	200,282	204,206
PPP_VL Scenario	**2020**	**2021**	**2022**	**2023**	**2024**
ART patients (18+)	205,395	222,972	227,673	232,161	236,710
Public Facility VL	137,395	133,106	102,371	104,388	106,433
PPP-VL	41,299	60,880	95,705	97,592	99,504
Total VLs	178,694	193,986	198,076	201,980	205,937

	2020	2021	2022	2023	2024
Baseline Scenario (US$)	6,825,213.40	$7,424,903.00	7,581,464.60	$7,730,885.20	$7,882,351.60
PPP_VL Scenario (US$)	6,748,914.08	$7,268,680.92	7,301,179.02	$7,445,085.14	$7,590,966.58
Cost Savings (US$)	$76,299.32	$156,222.08	$280,285.58	$285,800.06	$291,385.02
BWP Equivalent	P877,442.18	P1,796,553.90	3,223,284.18	P3,286,700.73	P3,350,927.71

- **Cost savings:**
  - More than USD 75,000 in year one
  - Will increase significantly and double in 2021 before reaching US$ 0.28 million in 2022. Current VL testing costs in the private laboratories as based on quantities:
    - 0-2,500 per month =$22,50
    - 2,500 – 5,000 per month = $20,00
    - 5,000+ per month = $17,50

- **Assumptions:**
  - Similar number of patients as DDDM will be devolved to access VL in private facilities
  - VL coverage- coverage is expected to remain at **87%,** but PPP_VL scenario will scale up coverage to **95%**

Assumptions					
Ability to Pay		83.7%	Baseline DSD Pool	$	-
VL Access (DDD)		95.0%	VL Access (Baseline)		85%
Cost per VL in private	$	22.5	VL annual reagents cost (public)	$	22
Avg. staff time per year for VL testing		1 Hour	Avg. Hourly Rate -Lab staff	$	12
Viral Load Suppression		96%	Viral Load Suppression		96%

Key take away messages

- DDD can lead to cost savings. Regular analysis using real-time data collected during implementation is critical to better understand cost of interventions and for implementation of activities to improve efficiency.

Preliminary High-Level Estimates of Resources Required to Support CDD in Eswatini

Decentralized Drug Distribution (DDD) Learning Collaborative

Rick Homan

Strategic Information Advisor, FHI 360, Botswana

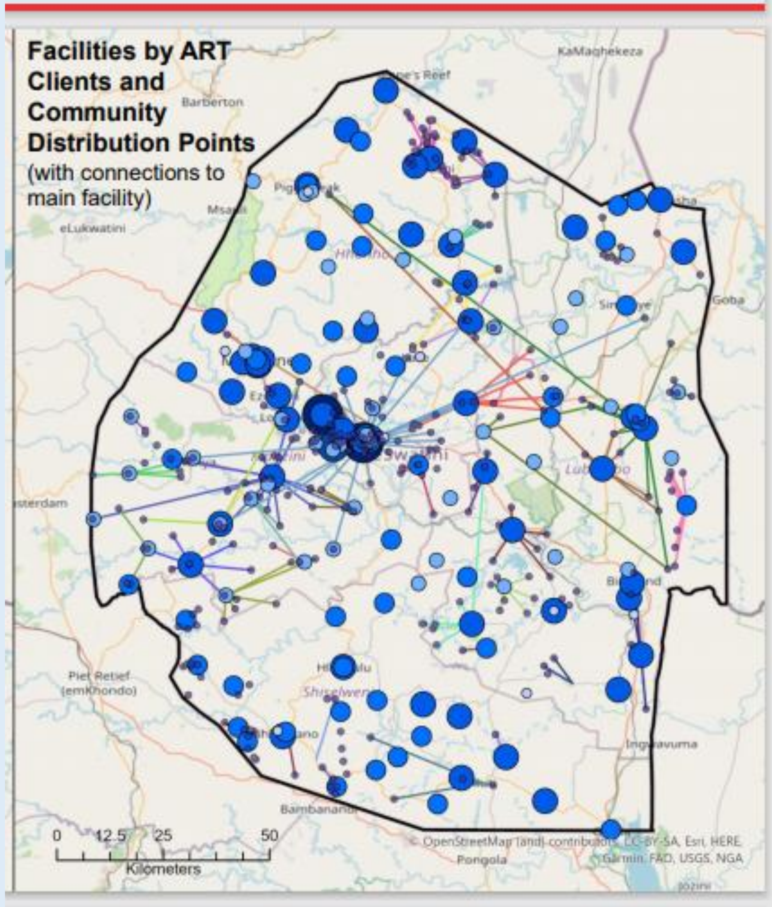
PEPFAR

USAID FROM THE AMERICAN PEOPLE

EpiC Meeting Targets and Maintaining Epidemic Control

CDD Model in Eswatini

- Community Drug Distribution implemented by 5 clinical partners in all 4 Regions of Eswatini
- As of Nov 30, 2020:
  2,262 ART clients received refills from 25 facilities supporting 272 pick up points
- Pick up points include: churches, community sites, outside petrol stations, etc.

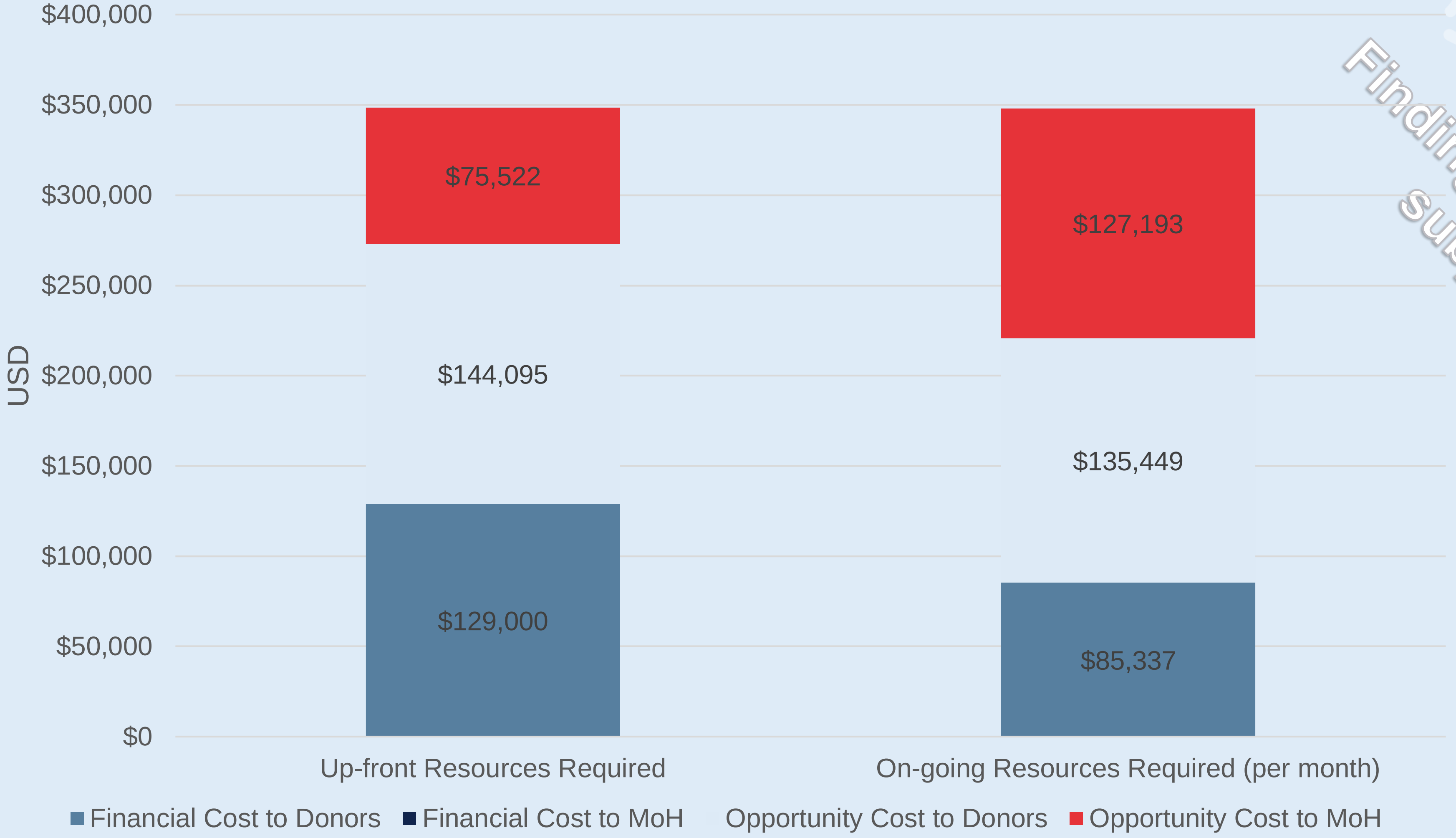


Guide to Estimates

- Distinguish between:
  - Costs to donors (resources controlled by implementing partners), and
  - Costs to MoH (resources controlled by MoH)
- Distinguish between:
  - Financial costs – costs where an additional transfer of funds is required
  - Opportunity costs – costs where no additional transfer of funds is required but an existing resource is redeployed to another or additional purpose
- Distinguish between:
  - Up-front costs – costs required to establish CDD system (reported as total)
  - On-going costs – costs required to keep CDD system operational (reported on monthly basis)

Note: Cost of ARVs excluded as there is no change in the # of clients on treatment, drugs are simply transferred to different locations

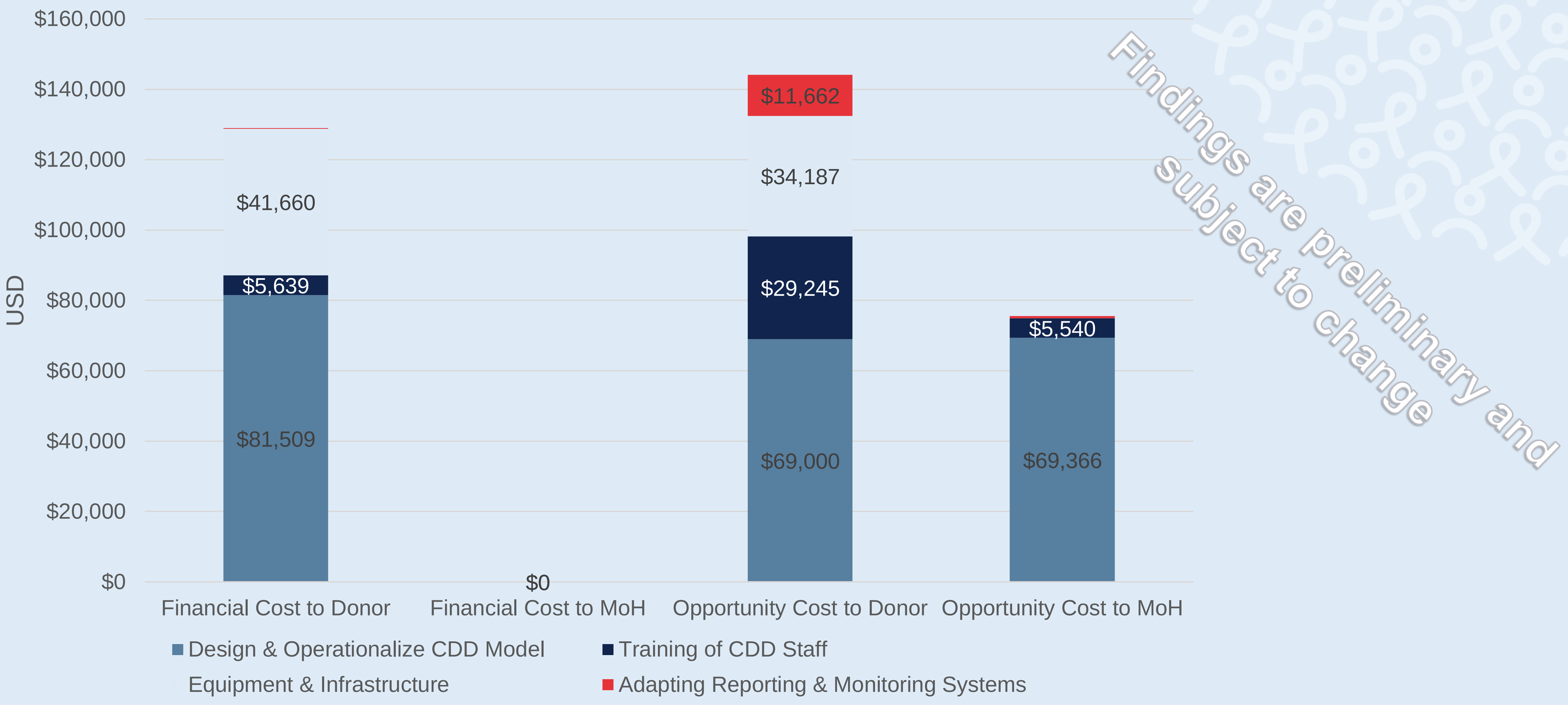
Top-Line resource requirements estimates



Findings are preliminary and subject to change

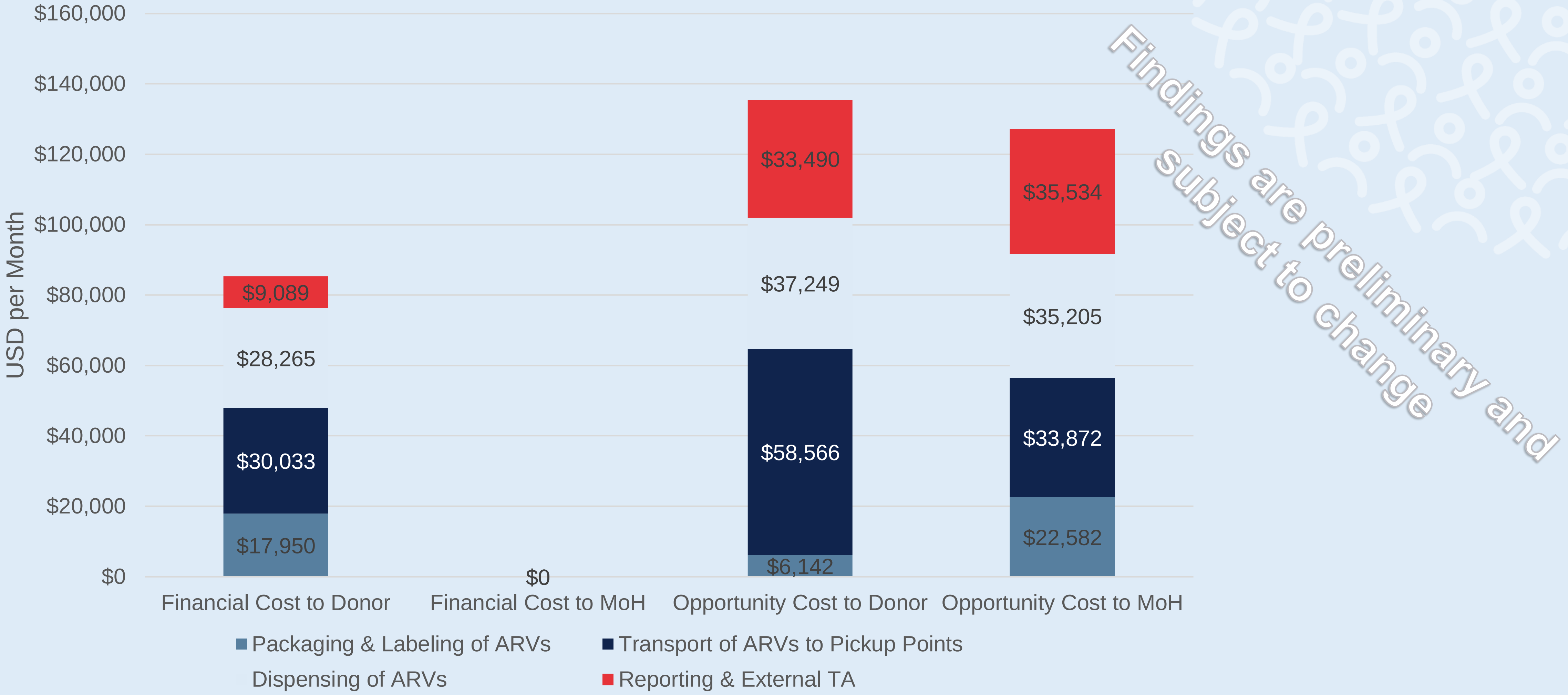
Note: Opportunity Cost to MoH overstated as excludes savings as MoH clinic staff are redeployed to other services

Up-Front resources required to establish CDD – by activity



Note: Opportunity Cost to MoH overstated as excludes savings as MoH clinic staff are redeployed to other services

On-going resources required to sustain CDD – per month by activity



Note: Opportunity Cost to MoH overstated as excludes savings as MoH clinic staff are redeployed to other services

Additional Estimates Pending

- Opportunity savings to MoH as clinic staff are spending less time with ARV re-supply clients
- Financial and opportunity savings to clients who can receive ARV re-supply closer to where they live:
  - reducing travel costs,
  - requiring less time in transit, and
  - perhaps less time waiting for service
- Cost of adapting M&E system and developing CDD dashboard will be included when finalized
- Private Pharmacy Model is being negotiated with MoH and may be included in costing exercise if desired by USAID

Costs and Outcomes of DSD Models for HIV Treatment in Sub-Saharan Africa

Sydney Rosen

December 2020

Introduction

Studies to be presented

Between 2017 and 2020, the EQUIP Project of USAID conducted a series of evaluations of the outcomes and costs of DSD models in use in 2014-2018 in multiple African countries.

Country	Models evaluated	
Observational studies of routine implementation		
Zambia	• Conventional care (SOC) • Mobile ART • Home ART delivery	• Urban adherence groups • Community adherence groups
Uganda	• Facility-based individual management (SOC) • Facility-based groups • Fast track drug refill	• Community client-led ART delivery • Community drug distribution points
Cluster-randomized trials		
Lesotho	• 3-month facility refills (SOC) • 3-month community adherence groups	• 6-month community distribution points
Zimbabwe	• 3-month facility refills (SOC) • 3-month community ART refill groups	• 6-month community ART refill groups
Malawi and Zambia	• Facility refills (SOC) • 3-month facility refills	• 6-month facility refills

Methods

- Methods varied by country but followed a common approach.
- Identify cohort of patients enrolled in the models of interest at a sample of study sites
- Follow them in their medical records for 12 or 24 months and extract:
  - Outcomes at 12 or 24 months after model or study enrollment (retained in care or not, virally suppressed or not)
  - All resources used by the health system over same 12 or 24 months (medications, lab tests, clinic visits, DSD interactions, infrastructure, etc.)
- From the study sites and other sources, collect unit costs for all the resources
- For each patient, multiply the quantities of resources used x the unit costs to get an <u>average cost to the health system per patient per year</u>
- In the three trials, patient costs are also reported
- Details for all the studies are available at https://cquin.icap.columbia.edu/wp-content/uploads/2020/09/DSD-Costing_Master-Deck_English_PDF-.pdf; references for publications are at the end of this slide set

Results: Zambia Observational Study

Models:

Conventional care (SOC)

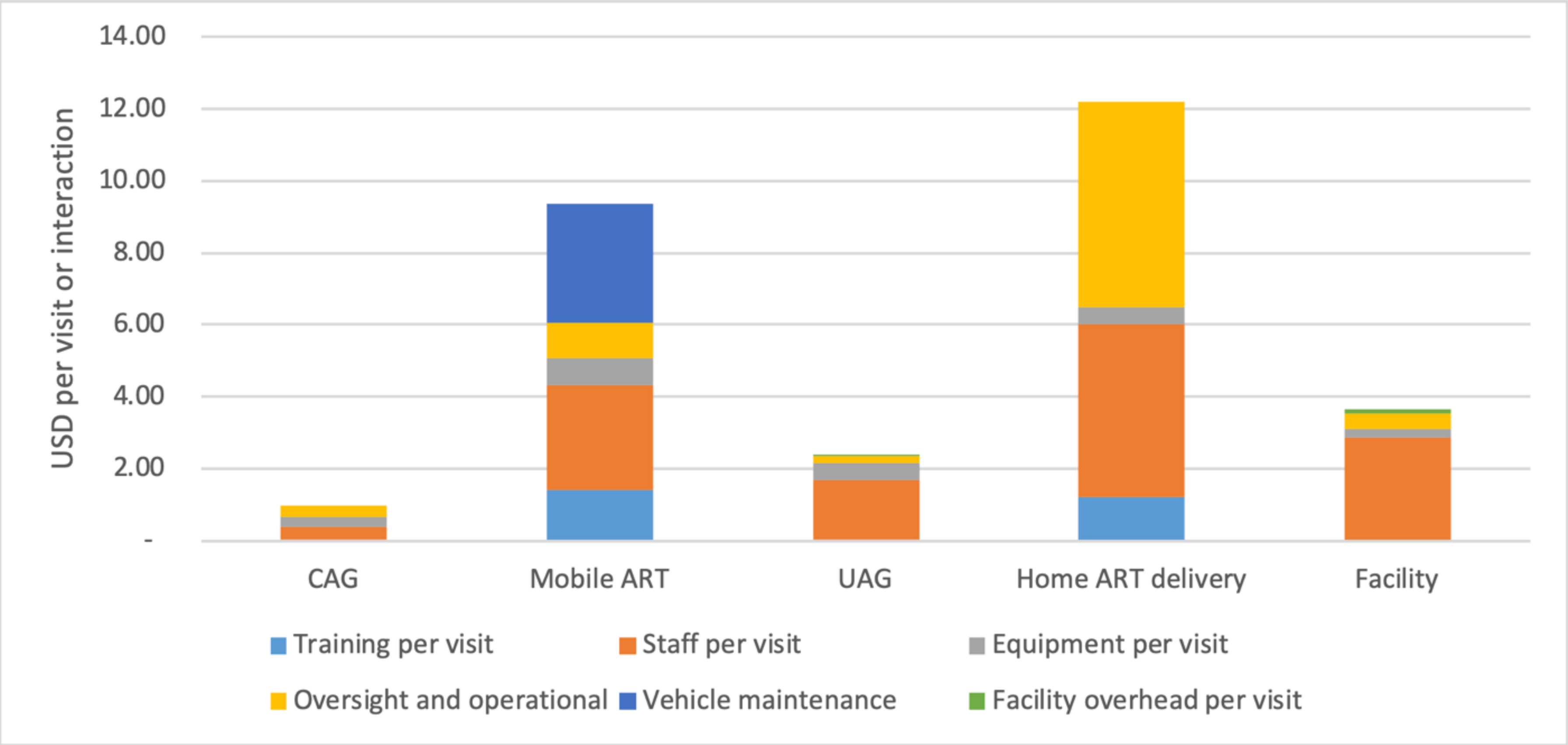
Mobile ART

Home ART delivery

Urban adherence groups

Community adherence groups

Cost/interaction, Zambia



UAG=Urban adherence group, CAG=community adherence group

In this chart, the X-axis reflects kinds of interactions associated with each model, but some models include both model-specific DSD interactions and facility visits

Outcomes and costs, Zambia

Value	Conventional care (SOC)	Mobile ART	Home ART delivery	Urban adherence groups	Community adherence groups
N	1174	216	169	193	754
Proportion retained at 12 months	81%	69%*	79%	95%	83%
Total annual cost per patient (high)	$100	$122†	$186	$160	$130
Total annual cost per patient (low)	$100	$122†	$137	$147	$116
Cost breakdown (amount, % of total/patient for low cost scenario):					
ARVs	$86 (85%)	$73 (57%)	$88 (63%)	$102 (68%)	$89 (76%)
Non ARV medications	$1 (0%)	$3 (2%)	$1 (0%)	$1 (0%)	$1 (0%)
Lab tests	$5 (4%)	$5 (3%)†	$5 (3%)	$23 (15%)	$7 (5%)
Interactions**	$9 (9%)	$46 (36%)	$45 (32%)	$22 (14%)	$4 (3%)

**This model enrolled patients at ART initiation, rather than only ART-experienced, stable patients.*

†Excludes laboratory costs; $127 /patient/year if we assume laboratory costs equal to conventional care.

***Interaction costs include clinic visits, DSD model interactions, and overhead and fixed costs.*

Results: Uganda Observational Study

Models:

Facility-based individual management (SOC)
Facility-based groups
Fast track drug refill
Community client-led ART delivery
Community drug distribution points

Outcomes and costs, Uganda

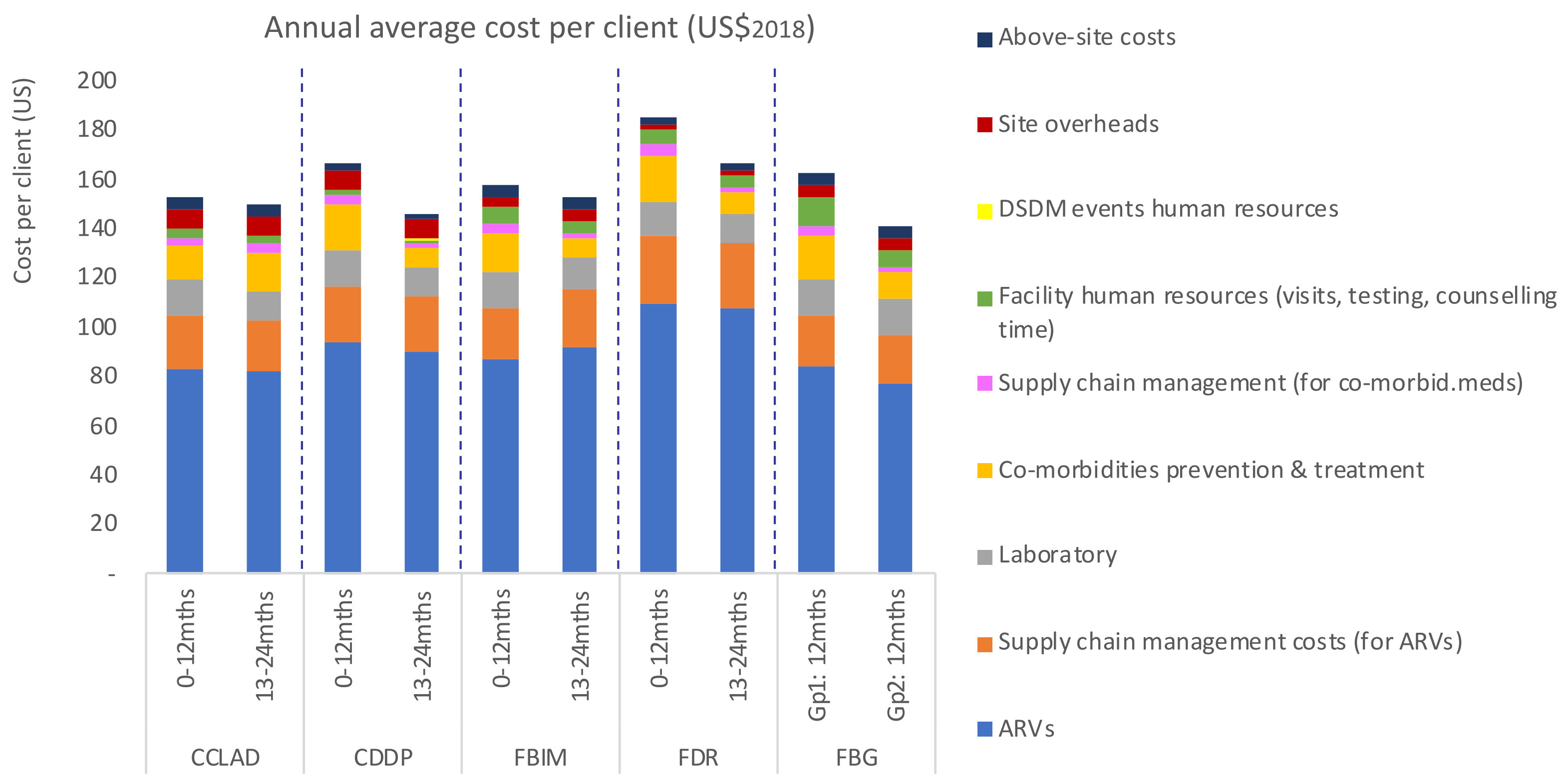
Value	Facility-based individual management (SOC)	Facility-based group	Fast track drug refill	Community client-led ART delivery	Community drug distribution points
N	128	129[†]	133	131	132
Proportion virally suppressed at 24 months	88%*	89%	90%	90%	92%
Total annual cost per patient (months 13-24)	$152	$141	$166	$150	$146
Cost breakdown (amount, % of total/patient:					
ARVs	$115 (76%)	$97 (69%)	$134 (80%)	$103 (69%)	$113 (77%)
Non ARV medications	$10 (7%)	$13 (9%)	$11 (7%)	$20 (13%)	$10 (7%)
Lab tests	$13 (9%)	$15 (11%)	$12 (7%)	$11 (7%)	$11 (8%)
Interactions**	$5 (3%)	$7 (5%)	$5 (3%)	$3 (2%)	$2 (1%)
Overhead and fixed costs, including above-site implementation costs	$9 (6%)	$9 (7%)	$5 (3%)	$13 (9%)	$11 (7%)

**This model enrolled all types of patients, including new and complicated cases, not only those stable on ART.*

[†]Facility based groups were limited to pregnant women in this study.

***Clinic visits and DSD interactions; personnel costs only.*

Average cost per client per DSDM in 2017 and 2018, Uganda



CCLAD: Community client-led ART delivery. CCDP: Community drug distribution points.
FBIM: Facility based individual management. FBG: Facility based groups. FDR: Fast track drug refill.

In this chart, the small decline in cost/patient between the first and second time periods probably reflects some reduction in services provided, especially co-morbidity care, and other secular trends in costs.

Results: Lesotho and Zimbabwe Cluster Randomized Trials

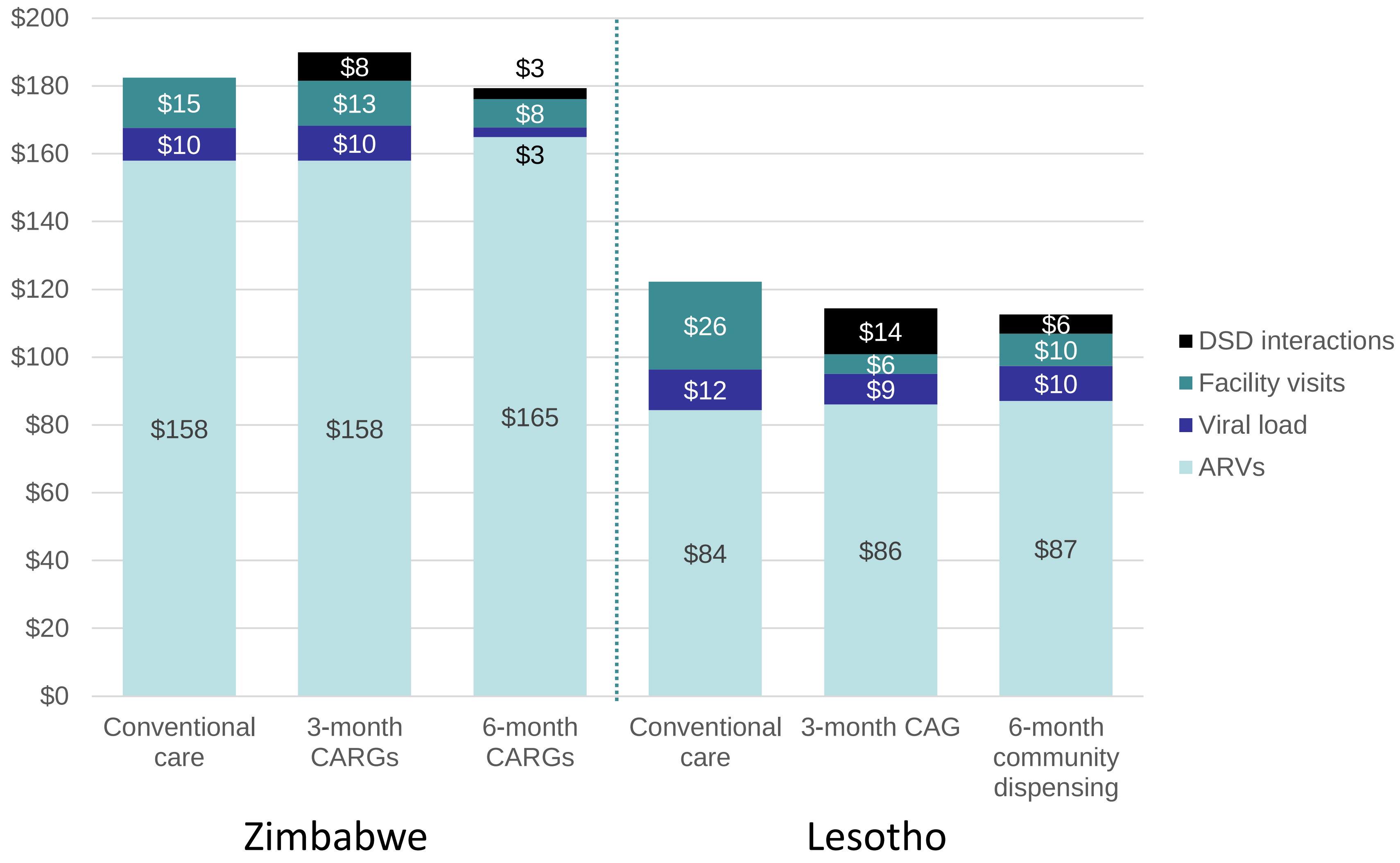
Models:
Lesotho
3-month facility refills (SOC)
3-month community adherence groups
6-month community distribution points

Zimbabwe
3-month facility refills (SOC)
3-month community ART refill groups
6-month community ART refill groups

Outcomes and costs, Zimbabwe and Lesotho

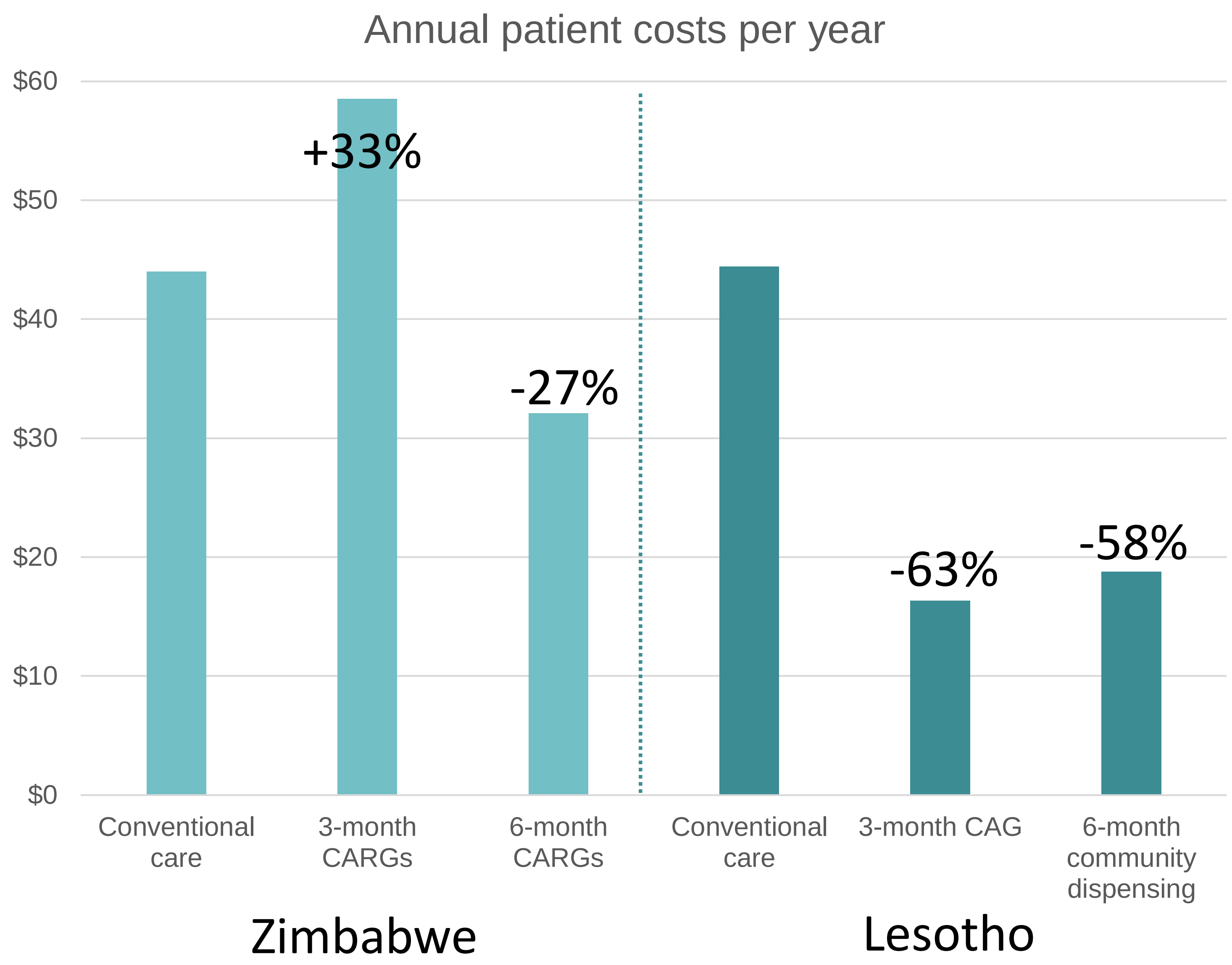
Value	Zimbabwe			Lesotho		
	SOC	3-month CARG	6-month CARG	SOC	3-month CAG	6-month community distribution
N	1,919	1,335	1,546	1,898	1,558	1,880
Proportion retained at 12 months	91%	93%	94%	97%	96%	95%
Total annual cost per patient	$183	$189	$179	$122	$114	$113

Provider cost breakdown, Zimbabwe and Lesotho



CARG, Community ART refill group; CAG, Community adherence group

Patient costs in Zimbabwe and Lesotho



Results: INTERVAL Cluster Randomized Trial (Zambia and Malawi)

Models:

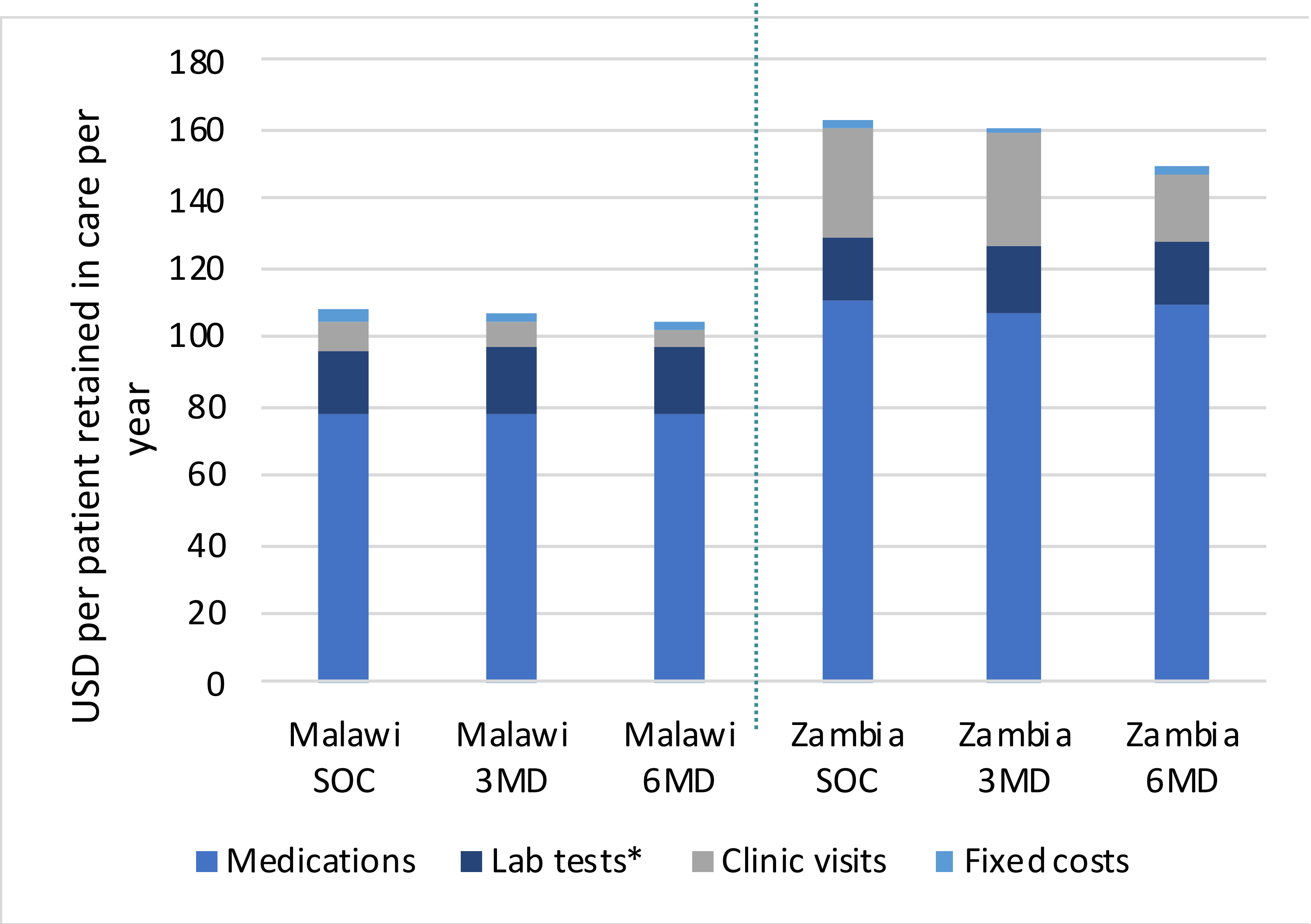
Facility refills (SOC)
3-month facility refills
6-month facility refills

Outcomes and costs, INTERVAL

Value	Malawi			Zambia		
	SOC	3-month refills	6-month refills	SOC	3-month refills	6-month refills
N	1,328	1,224	1,465	1,101	1,056	1,241
Proportion retained at 12 months	90%	90%	93%	75%	82%	90%
Total annual cost per patient	$86	$86	$85	$132	$134	$128
Clinic visits/year (mean)	5.4	4.9	2.9	4.6)	4.7	2.8
Days of ART dispensed/ year (mean)	364	365	368	368	358	367

Six-month dispensing was associated with a 9.1% (95% CI 0.9%, 17.2%) absolute increase in retention in care at 12 months after model entry and a very small reduction in provider costs, compared to SOC.

Provider cost breakdown, INTERVAL



*Added $19/patient for one viral load test per year. Laboratory test resource utilization data were not available.

Patient costs, INTERVAL

Values (median)	Malawi SOC	Malawi 3MD	Malawi 6MD	Zambia SOC	Zambia 3MD	Zambia 6MD
Time costs						
Total time/year (hours)	20.0	25.0	13.0	16.5	19.2	11.0
Work value lost/year*	$5.30	$6.63	$3.98	$15.00	$20.00	$9.98
Travel costs						
Proportion of patients incurring travel costs >0	23%	22%	46%	38%	38%	39%
Travel cost/year for patients incurring >0 cost	$6.89	$6.89	$4.96	$4.36	$4.15	$3.11

*Work value lost/year = median hours spent year x average national minimum wage of $1.33/day in Malawi and $4.99/day in Zambia

Conclusions

Conclusions (1)

- In Zambia and Uganda, conventional (standard) care costs slightly less than any of the alternative models in use in 2017-18 (no 6-month dispensing)
- In all the trials, 6-month dispensing cost slightly less than 1-3 month dispensing
- Savings to patients were substantial for 6-month dispensing

Conclusions (2)

- We should take into account outcomes and costs for the full ART patient population, not only stable patients (who should have better outcomes and cost less, by definition)
- Cost-effectiveness comparisons can be dodgy for DSD models
  - The unit of effectiveness (a retained patient) is not uniform across models, in terms of patient characteristics
  - The models are not fully interchangeable—a rural patient cannot participate in an urban adherence group, for example
- Monetary costs do not capture what we might care about most—reallocation of resources to increase efficiency

For more information

Most of the articles and slide sets listed below are available at www.sites.bu/ambit.

1. Do DSD models for HIV treatment save money for health systems? Primary data from Zambia, Uganda, Lesotho, Zimbabwe, and Malawi. AMBIT/CQUIN/EQUIP webinar, September 22, 2020. Available from: https://cquin.icap.columbia.edu/wp-content/uploads/2020/09/DSD-Costing_Master-Deck_English_PDF-.pdf .
2. Nichols BE, Cele R, Jamieson L, Long L, Siwale Z, Banda P, Moyo C, Rosen S. Community-based service delivery of HIV treatment in Zambia: costs and outcomes. *AIDS*; in press. https://journals.lww.com/aidsonline/Abstract/9000/Community_based_delivery_of_HIV_treatment_in.96564.aspx.
3. Hoffman RM, Balakasi K, Bardon A, Siwale Z, Hubbard J, Kakwesa G, Maambokoma M, Kalua T, Pisa P, Moyo C, Dovel K, Xulu T, Sanne I, Fox MP, Rosen S, for EQUIP Health. Eligibility for differentiated models of HIV treatment service delivery: an estimate from Malawi and Zambia. *AIDS* 2020; 34:475–479.
4. Long L, Kuchukhidze S, Pascoe S, Nichols BE, Cele R, Govathson C, Huber A, Flynn D, Rosen S. Retention in care and viral suppression in differentiated service delivery models for HIV treatment in sub-Saharan Africa: a rapid systematic review. *J Int AIDS Soc* 2020; 23:e25640. http://dx.doi.org/10.1002/jia2.25640
5. Larson BA, Pascoe S, Huber A, Long L, Murphy J, Miot J, Fox MP, Fraser-Hurt N, Rosen S. Will differentiated care for stable HIV patients reduce healthcare systems costs? J Int AIDS Soc 2020; 23:e25541. PMID: 32686911
6. Rosen S, Grimsrud A, Katz I, Ehrenkranz P. Models of service delivery for optimizing a patient's first six months on ART: an applied research agenda. Gates Open Res 2020, 4:116.
7. Huber A, Pascoe S, Nichols B, Long L, Kuchukhidze S, Phiri B, Tchereni T, Rosen S. Differentiated service delivery models for HIV treatment in Malawi, South Africa, and Zambia: A landscape analysis. medRxiv 2020.08.25.20181818. (doi: https://doi.org/10.1101/2020.08.25.20181818)
8. Provider costs associated with differentiated models of service delivery for HIV treatment in sub-Saharan Africa. https://sites.bu.edu/ambit/files/2019/10/AMBIT-report-02-provider-costs-Sept-27-2019-v1.1.pdf
9. Patient benefits and costs associated with differentiated models of service delivery for HIV treatment in sub-Saharan Africa. https://sites.bu.edu/ambit/files/2019/09/AMBIT-report-01-patient-benefits-and-costs-Sept-03-2019-v1.1.pdf
10. Fatti G, Ngorima-Mabhena N, Mothibi E, et al. Outcomes of three- versus six-monthly dispensing of antiretroviral treatment (ART) for stable HIV patients in community ART refill groups: a cluster-randomized trial in Zimbabwe. J Acquir Immune Defic Syndr. 2020;84):162-172.
11. Tukei BB, Fatti G, Tiam A, et al. Twelve-month outcomes of community-based differentiated models of multimonth dispensing of ART among stable HIV-infected adults in Lesotho: a cluster-randomized noninferiority trial. J Acqui Immun Defic Syndr 2020; 85:280-291.
12. Nichols B, Fatti G, Cele R, Lekodeba N, Maotoe T, Sejana MV, Chasela C, Faturiyele I, Tukei B, Rosen S. Economic evaluation of differentiated service delivery models for ART service delivery from a cluster-randomized trial in Lesotho: Cost to provider and cost to patient. Abstract PEE1626, AIDS 2020, July 6-10, 2020.

Acknowledgements

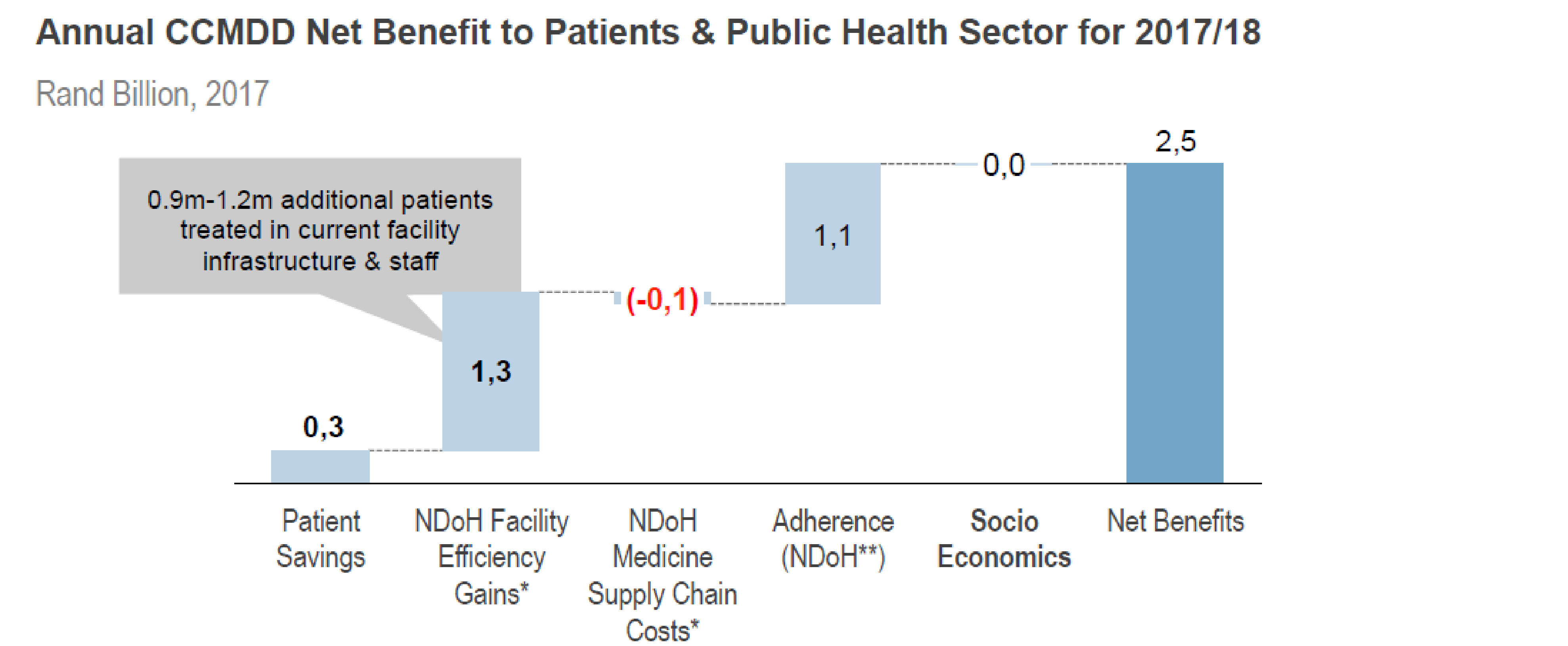
With thanks to:

- Patients and implementing partners who participated in the evaluations
- Ministries of Health in the participating countries
- EQUIP project and partners
- HE^{2}RO (Wits University)
- USAID
- PEPFAR
- AMBIT Project
- Bill & Melinda Gates Foundation

Panel discussion & Closing

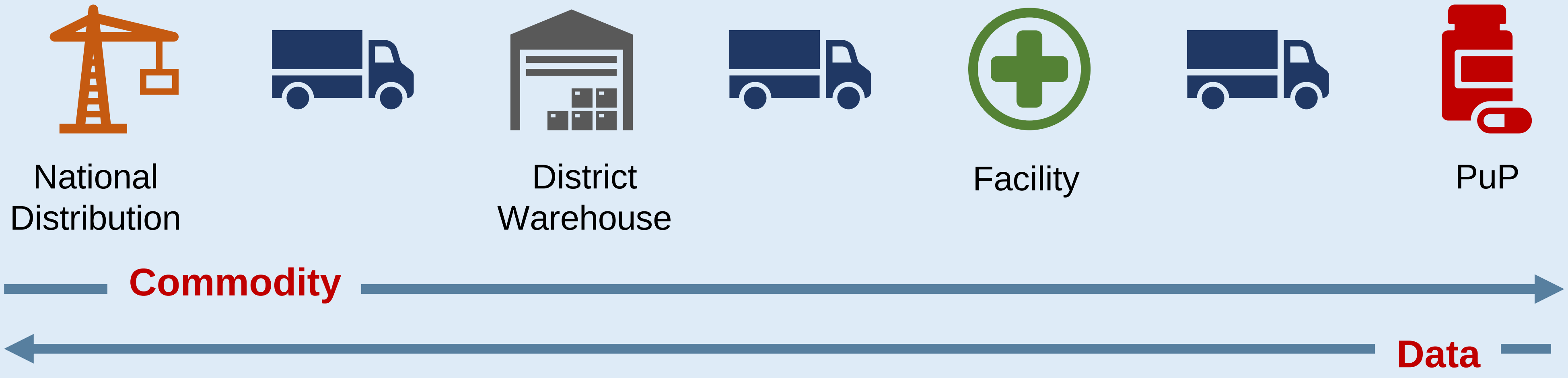
Lauren Weir and **Moses Bateganya**

In 2017, South Africa Central Chronic Medicine Dispensing & Distribution (CCMDD) **cost savings of ~$185 million USD**

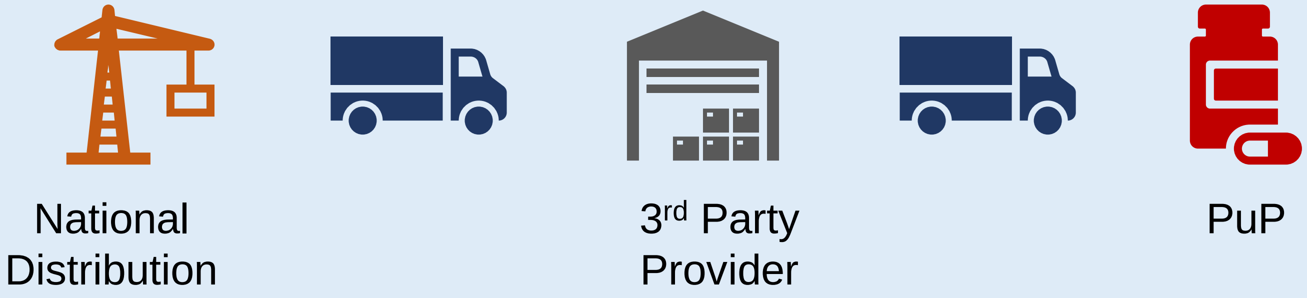


In 2017, CCMDD delivers:
- **43% Patient Cost reduction**
- **12-16% increase in PHC Facility Capacity**
- **48% Decrease in NDoH Cost to Serve Patients**
- **22% Increase in Adherence**

More analysis of DDD costs are needed, especially related to supply chain and data collection costs



A health systems approach, collaboration with private sector partners, and new technologies may help identify efficiencies and cost savings to facilitate the scale of DDD programs



As DDD models scale, we need to document and share efficiencies, lessons learned, and best practices

- Though there is much research on DSD models that consider multiple cost categories, more analysis is needed to understand cost drivers and savings across the health system including supply chain
- Collaboration with stakeholders in government, supply chain, and private sector are needed to consider a full range of opportunities to achieve cost efficiencies

Upcoming Session

Getting beyond the low-hanging fruit: Strategies and experiences in increasing demand for decentralized HIV services

Thursday, January 14, 2021

7:00 AM-8:30 AM EST | 13:00-14:30 CAT | 14:00-15:30 EAT

Register here