

DIFFERENTIATED SERVICE DELIVERY IN MALAWI: PROVIDER AND CLIENT COSTS OF HIV TREATMENT

Background

- ❖ Malawi has offered differentiated service delivery (DSD) models for HIV treatment since 2016. Current common models of care include 6-month dispensing (6MMD), mother-infant pairs, teen clubs, and high viral load clinics.
- ❖ The impact of Malawi's DSD models on the costs of providing HIV treatment incurred by healthcare facilities and by antiretroviral therapy (ART) clients has not been documented since the expansion of 6MMD. This brief presents preliminary estimates of facility and patient costs for ART clients in 6MMD, other DSD models, and conventional care.

Methods: Data

- ❖ From August 2022 to February 2023, AMBIT conducted the second round of the SENTINEL survey of ART clients at 12 public sector clinics in Chiradzulu and Blantyre Districts in the Southern region and Lilongwe District in the Central region.
- ❖ Survey respondents reported which ART delivery model they were enrolled in and provided information about costs they incurred in seeking care.
- ❖ Electronic medical records were matched to survey respondents and reviewed to estimate the number of clinic visits, medication pickups, and medications dispensed over a 12-month period. We did not have access to numbers of laboratory tests utilized.
- ❖ For each participant, the resource utilization period started on the date of enrolment into the SENTINEL 2.0 survey and ended 12 months later.
- ❖ SENTINEL also observed clinic healthcare providers in a time-and-motion study to estimate the duration of provider time used for each type of ART patient interaction.
- ❖ Unit cost data were drawn from Ministry of Health sources for medications, lab tests, and staff compensation.

Methods: Analysis

- ❖ We first created subgroups for each of the major models of care represented in our data set: 1) conventional care (undifferentiated); 2) 6-month dispensing (6MMD); 3) mother-infant pairs; 4) teen clubs; and 5) high viral load clinics. Three-month dispensing is the norm in models other than 6MMD.
- ❖ Using SENTINEL survey and EMR data, we counted the numbers of clinic visits, medication pickup visits, and ARV medications utilized by each individual in the 12-month observation period. We assumed one viral load test was conducted per participant per year.
- ❖ We then multiplied the quantities of resources utilized by the unit cost per resource to calculate a total cost per ART client for the 12-month observation period and estimated the average cost per client in each model of care.
- ❖ Using SENTINEL survey responses, we estimated the time required per client per visit and medication pickup (time for roundtrip transport, waiting, and receiving services)
- ❖ We multiplied the average time per visit or pickup by the same visit and pickup numbers described above to estimate a total time use per client per year in each model of care.
- ❖ Finally, we used SENTINEL responses to estimate average transport fares per client per year for those who reported incurring transport costs.
- ❖ Assumptions made in this analysis are listed on the last page of this policy brief.

Results

Table 1. Characteristics of the surveyed population, by model subgroup

Characteristic	Conventional care	6MMD	Mother-infant pair	Teen club	High viral load clinic
N (sample size)	134 (25%)	117 (21%)	118 (22%)	91 (17%)	45 (8%)
Median age	37	43	30	17	43
Female (N,%)	93 (69%)	80 (68%)	118 (100%)	48 (53%)	30 (67%)
Years on ART at study enrollment (median, IQR)	5.6 (2.8, 11)	10.3 (5.5, 14)	5.4 (3.1, 10.5)	11.6 (6.5, 15.1)	8.3 (2.8, 12.5)
Education					
Primary school or less	81 (60%)	73 (62%)	78 (66%)	49 (54%)	31 (69%)
High school or more	53 (40%)	44 (37%)	40 (34%)	42 (46%)	14 (31%)
Employment					
Formal employment	8 (6%)	9 (7%)	3 (2%)	0 (0%)	1 (2%)
Informal employment	93 (69%)	91 (78%)	68 (58%)	2 (2%)	35 (78%)
Unemployed	28 (21%)	16 (14%)	46 (39%)	5 (6%)	8 (18%)
Student or trainee	5 (4%)	1 (1%)	1 (1%)	84 (92%)	1 (2%)
Facility setting					
Rural	67 (50%)	65 (56%)	68 (58%)	53 (58%)	29 (64%)
Urban	67 (50%)	52 (44%)	50 (42%)	38 (42%)	16 (36%)

- ❖ Demographic and other differences were largely consistent across models, except where the model was limited to specific subgroups (teen clubs, mother-infant pairs).
- ❖ Time on ART at study enrollment varied by model, with 6MMD and teen club participants on ART at the study sites being on treatment for a median of more than 10 years and those remaining in conventional care on ART for a median of just over 5 years.
- ❖ Very few participants reported formal employment, but most said that they engaged in informal economic activities (except for students in teen clubs).

Table 2. Resource utilization and cost per ART client per year (365 days), by model subgroup

Cost ingredient/variable	Conventional care	6MMD	Mother-infant pair	Teen club	High viral load clinic
N	134 (25%)	117 (21%)	118 (22%)	91 (17%)	45 (8%)
% retained at 12 months (EMR data)	78.8%	90.0%	90.1%	94.0%	88.2%
Clinic visit utilization					
Average number of clinic visits per year (EMR)	3.42	3.04	3.93	6.16	5.35
Average time spent per visit (minutes)					
Nurses	6.07	4.87	6.86	6.01	5.91
Clinicians	8.62	6.02	9.05	6.52	11.94
Personnel costs per visit	\$1.73	\$1.17	\$1.70	\$1.35	\$1.85
Costs per patient per year					
Personnel	\$5.91	\$3.54	\$6.68	\$8.32	\$9.92
ARV medications	\$34.85	\$36.82	\$34.67	\$30.59	\$32.91
One viral load test (assumed)	\$17.08	\$17.08	\$17.08	\$17.08	\$17.08
Facility overhead (assumed at 10%)	\$5.78	\$5.74	\$5.84	\$5.60	\$5.99
Total cost/patient/year (USD)	\$63.63	\$63.19	\$64.27	\$61.59	\$65.90

- ❖ 6MMD was the least expensive model of care for adults assessed, costing about 1% less than conventional care, due both to smaller numbers of visits per year and less time spent per visit. (Many clients in conventional care also receive 6-month dispensing from time to time, reducing the apparent cost difference between the models.)
- ❖ Teen clubs appear to be low-cost due to lower reported expenditure on ARV medications. A missed visit in a teen club may be more likely to lead to a short treatment interruption than it would in other models, but very high retention rates in teen clubs appear likely to offset any greater risk of short-term interruption.

Table 3. Unit costs for resources utilized

Resource	Unit	Cost/unit (USD)	Source
ARV medications (TDF-3TC-DTG)	Month	\$3.24	Consultation with Ministry of Health, April 2024
Viral load test	Test	\$17.08	Costed standard equipment list from the Health Sector Strategic Plan III
Event (visit/interaction) cost for each common model of care			Calculated from staff salaries and SENTINEL time-and-motion data
Conventional care	Event	\$1.73	
6MMD		\$1.17	
Mother-infant pair		\$1.70	
Teen club		\$1.35	
High viral load clinic		\$1.85	

Table 4. Average cost to ART clients per year, by model subgroup

Model	N	Median (IQR) total time spent in hours per year	% incurring transport costs	Mean transport cost/client incurring any transport cost/year (USD)
Conventional care not eligible for DSD	55	8.0 (5.6, 16.8)	35%	\$18.69
Conventional care eligible for DSD but not enrolled	79	9.6 (6.0, 16.0)	46%	\$21.75
6-month dispensing	117	6.0 (3.0, 9.0)	48%	\$13.55
Mother-infant pairs	118	12 (6.4, 18.4)	43%	\$19.59
Teen club	91	12 (6.4, 19.2)	36%	\$19.95
High viral load clinic	45	16.0 (8.0, 24.0)	44%	\$30.29

- ❖ Patients enrolled in 6MMD spent about two thirds of the time seeking care as patients enrolled in conventional care, and less than half compared to other DSD models. The difference is equivalent to approximately one working day.
- ❖ Fewer than half of all patients incur transport costs; most walk to the clinic. For those who do pay for transport, the cost for those in 6MMD, which was the lowest among all models of care, is equivalent to >10 days' minimum wage for a domestic worker (minimum wage = \$1.15/day).

Conclusions

- ❖ 6MMD is slightly less expensive for providers and saves substantial time for patients compared to conventional care.
- ❖ The difference in provider and patient costs between the models were largely attributable to differences in numbers and durations of clinic visits.
- ❖ Because medications and viral load tests comprise a large proportion of total costs, there is little room for lower-intensity models to reduce budgets, but 6MMD frees up human and infrastructural resources for other uses (e.g. larger patient volumes, higher quality HIV care, non-HIV care).
- ❖ Results assume that clients not enrolled in 6MMD incur similar costs to those remaining in conventional care, but it is possible that those not enrolled may have greater healthcare needs, for example if patients judged to be healthier or better adherers are preferentially enrolled in 6MMD.
- ❖ Limitations include small sample size for all aspects of the study (patients, providers, time-and-motion observations) and inability to distinguish between clients eligible and not eligible for DSD within the conventional care sample, due to lack of laboratory data.
- ❖ **The cost differences between models of care are not budgetary savings but rather the value of resources, such as staff time, that can potentially be re-allocated for other uses.**

Cost assumptions and limitations

- Sample size is not representative of national model uptake. SENTINEL aimed to enroll a minimum of 10 participants per model per site, but actual enrollment reflected site-specific model uptake.
- Conventional care results combine clients eligible for DSD but not enrolled and clients not eligible for DSD, including unsuppressed and comorbid clients.
- Many conventional care clients have an instance of 6-month dispensing over the observation period, despite not being formally enrolled in six-month dispensing.
- Models with <10 clients enrolled in SENTINEL were excluded from the analysis.
- This analysis is limited to HIV treatment (ART); no consideration of other care or medications provided by same facilities for other conditions.
- Provider estimates are limited to facility-level costs; no inclusion of overall program management costs.
- Numbers of clinic visits and other resources used were not verified; there is likely some over- and under-reporting in the EMR.
- Assumed one viral load test/client/year; no data available on actual uptake or potential differences in uptake by model of care.
- For clinical staff cadres, salary cost per minute was estimated by dividing the average salary cost per month by number of minutes per month (working minutes per month).
- Salary cost per interaction was estimated by multiplying cost per minute by the average number of minutes per type of interaction and staff cadre for each model subgroup, using time estimates from the SENTINEL time and motion study.
- Non-clinical staff categories included in the analysis were administrative clerks and receptionists, data capturers, cleaners, groundsmen, and security guards.
- Non-clinical staff salary cost per clinic visit was estimated by taking the total monthly salary cost for all non-clinical staff at all facilities in the sample and dividing it by the average monthly headcount for the entire sample. Non-clinical staff costs per visit were not weighted by facility size.
- Assumed standard first line regimen (TDF/3TC/DTG) for all participants.
- Number of ART medications included was taken from EMR records and reflects actual reported dispensing.
- For instances where >12 months of medications appeared to have been dispensed, actual costs for the quantity dispensed was used until the last visit. Over-dispensing at the last visit in the observation period was excluded, as extra medications could be used after the 365-day observation period ended.
- Overhead costs were estimated as a percentage (10%) of the total variable cost, to capture variable infrastructure use (consulting rooms, waiting space, etc.) during clinic visits.