Differentiated antiretroviral therapy delivery in rural Zimbabwe: availability, needs and challenges

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Abstract

Introduction: The traditional “one-size-fits-all” model of HIV care whereby people living with HIV (PLWH) have regular individual clinical visits does not reflect the various preferences and needs of PLWH and stretches the capacity of health facilities (HFs). Little is known about the availability and the experience of differentiated HIV care delivery in the rural areas of Zimbabwe.

Methods: We used a mixed-method approach to collect data from clients and providers at 26 HFs in Zimbabwe in 2019. We collected quantitative data about antiretroviral therapy (ART) delivery and time spent at the HF during a visit from one representative healthcare providers (HCP) and a stratified sample of PLWH at each HF. We performed semi-structured interviews among HCPs and focus group discussions (FGDs) among PLWH to collect information about the implementation of differentiated ART delivery (DART) models and their experience. We performed linear regression models to assess factors associated with the time spent in the HFs. We analyzed the interviews using an inductive approach. Transcripts were coded and constricted down to themes significant to the research objectives.

Results: The majority (77%) of participating HFs offered at least one of the five DART models recommended in Zimbabwe: 13 (50%) offered community ART refill group (CARG), 1 (4%) club refill, 6 (23%) family refill, and 8 (31%) fast-track refill models. Mobile outreach was not available at any participating HF. In an unadjusted linear model, PLWH enrolled in the fast-track refill model spent 0.40 (95% confidence interval (CI): 0.15-0.56) less time at the HF than PLWH on routine care, whereas PLWH in the family refill model and delegated to go to the HF spent 2.63 (95% CI 1.42-4.88) more time at the HF during visit. Confidentiality and disclosure concerns were highlighted as the major barriers affecting the implementation of DART models, together with travel costs and waiting times. HCPs reported on the challenge of excessive workloads. Fast-track refill was perceived as the most adapted DART model to meet clients’ needs, followed by CARG and family refill.

Conclusions: Confidentiality, travel costs and waiting times are key elements to consider in the implementation of differentiated care in rural Zimbabwe. More implementation research is needed to support the roll-out of differentiated HIV services in that region, especially DART models addressing the needs of PLWH. Our study supports the call for personalized care at ART programs in rural Africa.

Introduction

As the number of people living with HIV (PLWH) on life-long antiretroviral therapy (ART) increases, maintaining long-term engagement in care without overburdening health systems is a challenge, especially in Sub-Saharan Africa. The traditional “one-size-fits-all” model of care, whereby PLWH have regular individual visits at the clinic, does not always meet the client’s preferences and stretches clinics to their limits. Differentiated service delivery (DSD) offers client-centred HIV services across the cascade, from testing to ART delivery and is an essential component to reach the 95-95-95 UNAIDS targets [1,2].

Differentiated ART delivery (DART) plays an important role in decongesting HIV care facilities (HF), in particular for stable clients. DART models can reduce the numbers or duration of clinical visits by offering alternative ways of delivering ART and care. DART models include health care worker-managed groups (e.g. club refill groups), client-managed group models (e.g. community ART refill groups or family refill groups), facility-based individual models (e.g. fast-track ART refill) and community-based individual models (e.g. mobile outreach clinics) [3]. The World Health Organization (WHO) endorsed DART in 2016 to strengthen clients’ satisfaction, service efficiency and quality of care [4].

Advantages of DART over routine care include higher adherence to ART, improved retention in care, reduced time spent at the clinic and reduced travel costs [5,6]. Having fewer HF visits and decentralized care is attractive to clients who struggle to find the time to come to the HF at regular intervals or those who incur travel costs, especially those travelling long distances. Extended opening hours can also facilitate the logistics of professionally active clients or school-age children while reducing waiting times.

Sub-Saharan Africa carries a heavy burden of HIV and is at the forefront of innovative solutions for sustaining HIV care. Zimbabwe is one of the most affected countries in sub-Saharan Africa, with an estimated HIV prevalence among adults of 12.7% in 2018 [7]. The “treat all” strategy was introduced in 2016 in Zimbabwe, and there were an estimated 1.2 million PLWH on ART in 2018 (unaids.org). To accompany health care clinics, the Ministry of Health (MoHCC) recommends the roll-out of DSD models in Zimbabwe since 2015 and published the Operational Service Delivery Manual (OSDM) in 2015, with a reprint in 2017 [3].

Little is known about the availability of DART in the rural areas of Zimbabwe and about the experience of DART among clients and health care providers (HCPs). In this project, we used a mixed-method approach, combining quantitative and qualitative methods to assess the availability of DART models and the experience of HCPs and clients in the rural district of Bikita, Masvingo Province, Zimbabwe.

89 **Methods**

90 *Study design*

91 We conducted a cross-sectional survey of all 26 HIV care facilities (HFs) in Bikita District, Province of
92 Masvingo, Zimbabwe in 2019. Bikita District has a population of 174'068 on 5,180 km². Health services
93 are provided by 2 district hospitals, 2 rural hospitals and 22 rural health centers (RHCs). SolidarMed, a
94 health organization working in partnership with the Zimbabwean Ministry of Health, supports HIV
95 services at all participating facilities. Eighteen HFs were members of the International Epidemiology
96 Databases to Evaluate AIDS in Southern Africa consortium (IeDEA-SA, iedea-sa.org, [8]). The survey
97 consisted of the collection of quantitative and qualitative data of PLWH and HCPs. Data collection
98 tools were designed following guidance provided in the OSDM manual on the assessment of HFs in
99 Zimbabwe [3]. Data were collected between May and August 2019.

100 *Quantitative data collection*

101 We used a standardized questionnaire to collect quantitative data from HCPs and PLWH. We recruited
102 one representative per HF (a nurse or a clinic-nurse in charge) to answer HF-level questions. The
103 participating HCPs were experienced in HIV care service delivery and assigned to the interviewers by
104 the HF's clinic-nurse in charge to participate in the survey. HCP-level questions were answered by
105 HCPs working for more than one year at the HF. Questions included the number of PLWH in care,
106 number of HCPs, the use and possibility of tracing clients, DART models available, HCP workload, and
107 key populations in care at the HF. In addition, we recruited a purposive sample of PLWH during the HF
108 assessment. The sampling strategy defined five strata: caregivers of children between 0-15 years,
109 adolescents and young people between 16-24 years, men >24 years, pregnant or breastfeeding
110 women >24 years, and non-pregnant or non-breastfeeding women >24 years. Children were
111 represented by their caregiver, and in some instances, the child assisted in responding to the
112 questions. We intended to recruit between 3 and 6 PLWH in each strata (for a total of 15 to 30 PLWH
113 per HF). PLWH being for ≥6 months on ART at the current HF were eligible for this study. Data obtained
114 from PLWH included age, gender, and the model of care. In a sub-group of individuals, we determined
115 the time spent in the HF (from registration until leaving the facility, including waiting times and time
116 spent at each service accessed during the visit), using a stamp-card indicating entry and exit times at
117 each location. Data collection tools were available in English on Android electronic devices.
118 Questionnaires were pilot-tested electronically and on paper. We used the REDCap (Research
119 Electronic Data Capture, projectredcap.org) tool to collect and manage the data [9,10].

Qualitative data collection and analyses

We performed individual or paired semi-structured interviews of one or two representative HCPs at each participating facility. Depending on the number of staff working at the HF and their availability, the clinic-nurse in charge assigned 1 or 2 staff members involved in HIV service provisioning to participate in the interviews. Interview guides included topics on HIV services offered to PLWH at the HF, HIV client groups attending the HF, barriers and challenges in accessing ART, and implementation and availability of DART models.

We performed focus group discussions (FGDs) among the following groups of clients, each at a different HF with a sufficient number of clients for the defined group: caregivers on behalf of children between 0-15 years, adolescents (mixed gender) between 16-24 years enrolled in a Community ART Refill Group (CARG), adolescents receiving routine care (mixed gender), men older than 24 years on either routine care or DART, pregnant or breastfeeding women older than 24 years on either routine care or DART, and other women older than 24 years on either routine care or DART. The topic guide was generally standardized across groups, covering questions on HIV services offered to PLWH at the HF, perceived barriers and challenges in accessing ART, and implementation and availability of DART models. The criteria used to select the FGDs was client flow of the targeted group and availability. FGDs were done at different HFs; two at district hospitals (men and adolescents) and four at RHC (caregivers, women, pregnant or breastfeeding women, and adolescents).

Two trained interviewers accompanied by an assistant, not previously known to the participants, conducted interviews and FGDs in Shona. Semi-structured interviews with HCPs lasted between 30 and 60 minutes, FGDs between 60 and 120 minutes. All interviews were conducted at the HF in a private place to ensure the privacy and comfort of PLWH. We audio-recorded interviews, transcribed them, and translated the Shona transcripts into English. Transcripts were coded and managed using data Atlas.Ti (Version 8.4.4). We used an inductive approach identify patterns and uniformities in the data, in relationship with the research objectives. We used a thematic analysis to identify and categorize codes emerging from the data. We then grouped codes into categories, narrowing down to themes which continued to be constricted down until no new themes emerged [11,12].

Quantitative data analyses

We used descriptive statistics to analyze the availability of DART models at participating HF and the differences e.g., gender, pregnancy-status, travel time, time on ART, and duration of visits, in enrolled PLWH. We used linear regression to assess the differences in the log-transformed total time spent at the HF; the coefficients were then back-transformed. We adjusted the model for DART (routine care,

facility- or community-based model), level of care of the HF, the client-staff ratio, gender including pregnant/breastfeeding status, and age. All analyses were performed with R v3.6 [13].

Definitions

There were three levels of care among participating HFs. RHCs provided primary outpatient care and are staffed by a small team of nurses under the lead of a nurse in charge. Rural hospitals offered limited inpatient facilities and basic laboratory services. District hospitals were larger and offered more specialized care. Zimbabwe introduced five DART models. 1) CARGs included up to 12 PLWH from the same geographical area, separated by age and gender at some but not all HFs; one member was nominated to collect the drugs from the facility and distribute the refill to other group members during the year. 2) Family refill groups consisted of willing HIV positive family members, collecting ART at the HF on behalf of the others. 3) The outreach model was a community-based individual ART delivery model for clients from hard-to-reach areas. 4) Club refill groups were facility-based groups led by HCPs, with up to 20 clients of mixed gender and age; members would collect their medications together on the same date and venue. 5) The fast-track model was a facility-based individual refill model, whereby ART is dispensed from the pharmacy instead of during clinical consultation, aiming for a visit duration of 30 minutes maximum. Models 1, 2 and 3 were defined as community-based models; models 4 and 5 as facility-based models. DART models were only available for stable clients. Stable clients were defined as clients with a viral load (VL) of less than 1000 copies/ml, no current opportunistic infection (OIs) and at least six months at their current regimen; for clients who have no access to VL, the definition was based on the absence of OIs, a CD4 value above 200 cells/mm³, and at least six months on current regimen [3].

Ethics

The Cantonal Ethics Committee Bern (Switzerland) and Provincial Medical Directorate (Zimbabwe) approved this project. leDEA sites have ethics approval for contribution and use of data to leDEA collaborative analyses. All individuals provided informed consent before participating.

Results

Availability of differentiated ART delivery models

We collected qualitative and quantitative data of 26 HF in rural Zimbabwe. A total of 26 interviews were conducted with HCPs, 22 were individual and 4 were paired interviews. Twelve HFs (46%) were owned by councils, 10 (38%) by governments, 3 (12%) by missions, and 1 (4%) was private. Twenty-two (84%) HFs were RHCs, two (8%) were district hospitals, two (8%) were rural hospitals. The median client-staff ratio was 71 (IQR 42-96). HFs offered on average one DART model (range 0-3) in addition to routine care ([Table 1](#)). Six HFs (23%) offered only routine care, and the remaining 20 HFs (77%) had at least one DART model available. In total, 13 HFs (50%) offered CARG refill, 1 (4%) club refill, 6 (23%) family refill, 8 (31%) fast-track refill, and 6 (23%) only routine care. ART delivery through mobile outreach was not available at any participating HF.

Enrolment in differentiated ART delivery models

We collected data from 378 PLWH at 25 of the 26 participating HFs. No PLWH were recruited at one of the RHC because there were no visits on the day of data collection. On average, 15 PLWH participated at each HF (median 16, interquartile range (IQR) 12-19). Their age was 41 (IQR 32-51) years, 245 (65%) of the participants were female (and 133 (35%) were male; [Table 2](#)). Of all participants, 30 (8%) were enrolled in a CARG model. Of those, 20 (67%) were female (one was pregnant and five were breastfeeding) and 10 (33%) male. Eight (2%) were enrolled in the club refill model, one in a rural health center and seven in a district hospital. Of those, seven (88%) were female (one pregnant and two breastfeeding) and one (13%) male. All seven (2%) participants enrolled in a family-refill model went to a RHC, four (57%) were female (one was pregnant) and three (43%) male. All 36 (10%) participants enrolled in a fast-track model were from RHCs or rural hospitals, 22 women (61%, one pregnant and six breastfeeding) and 14 were male (39%). The median number of annual visits to the HF was four visits per year for clients on routine care or on any of the DART models, except for club refill clients who came five times per year (IQR 4-6). The median travel time from the clients' home to the HF was 60 (IQR 30-120) minutes. Participants in the CARG model had a median travel time of 45 (IQR 30-120) minutes, in the club model: 90 (IQR 90-113) minutes, in the family-refill model: 60 (IQR 60-105) minutes, and in the fast-track model: 53 (IQR 29-68) minutes ([Table 2](#)).

Time spent at the clinic

We assessed the time spent at the HF among a subgroup of 203/378 (54%) participants. The median duration of a visit at the HF was 27 (IQR 16-61) minutes, from arrival at the HF until departure. Participants visited their HF 4 (IQR 4-4, range 1-12) times a year. We observed differences in visit durations across models of ART delivery ([Table 2](#)). Participants on routine care spent 31 (IQR 16-62)

minutes at the HF and had 4 visits a year (IQR 4-4, range 1-12); participants on community-based models spent 69 (IQR 19-128) minutes, varying from 23 (IQR 16-139) minutes with 4 (IQR 4-12, range 2-12) visits a year if they were enrolled in the CARG refill model, to 91 (IQR 72-106) minutes with 4 (IQR 4-4, range 4-6) visits a year if they were on a family refill model. Participants on facility-based model spent 20 (IQR 13-28) minutes at the HF, 18 (IQR 12-26) minutes with 4 (range 4-12, IQR 4-4) visits a year for those on the fast-track model and 28 (IQR 24-30) minutes on club refill model with 5 (IQR 4-6, range 3-12) visits a year.

We performed a linear regression assessing factors associated with the time spent in the HFs ([Figure 1](#)). The model was adjusted for DART (routine care, facility- or community-based models), level of care of the HF, the client-staff ratio, gender including pregnant/breastfeeding status, and age. In an unadjusted linear model, PLWH enrolled in the fast-track model spent 0.60 (95% confidence interval (CI) 0.44-0.82) less time in HF compared to routine care, whereas a delegated family member (enrolled in the family-based refill model) spent 2.63 (95% CI 1.42-4.88) more time in HF. There was no evidence that the visit duration of PLWH attending a club and CARG refill model differed from routine care. In the adjusted model, there was evidence that PLWH enrolled in a family refill model spent more time at the HF, 1.98 (95% CI 1.08-3.63). Clients who went to an HF with a higher client-staff ratio (>100) spent in an unadjusted 0.51 (95% CI 0.39-0.66), and adjusted model 0.53 (95% CI 0.39-0.71), less time in the HF than those attending HFs with lower client-staff ratio. The visit duration did not differ by gender in general. However, there was evidence that pregnant women spent more time at the HF compared to men who were taken as control group: 2.31 (95% CI 1.25-4.28) an unadjusted and 2.22 (95% CI 1.23-4.02) in an adjusted linear regression model ([Figure 1](#)).

About perceived or experienced advantages of DART models

We analyzed qualitative data collected from clients in FGDs and from HCPs in individual or paired semi-structured interviews. We identified the following themes, which emerged from the data with regards to care delivery: 1) confidentiality and disclosure, 2) travelling long distances and costs, 3) waiting times.

Confidentiality and disclosure

HCPs indicated that the major barrier to the implementation of DART models was confidentiality and disclosure. This was also supported by evidence from the interviewed clients, who highlighted confidentiality to be the ultimate impediment in their choice of DART models.

“Everything comes back to issues of confidentiality” (Adolescents FGD on routine care, RHC)

242 To address confidentiality concerns, the fast-track model was designated as optimal, especially among
243 clients who had not disclose their HIV status. Indeed, fast-track ART refill allowed collecting ART
244 without being seen by others in the community.

245 “Fast track will be more appropriate given our sub population within our catchment area. We have
246 uniformed forces, teachers and others who would want to always maintain confidentiality” (HCP, Private
247 Clinic)

248 “Fast track is good because our patients do not want their status disclosed since we are workmates so they
249 see it good to collect their medication on their own. It helps patients to continue taking their medication
250 because they will know that it is their secret” (HCP, Private Clinic)

251 In contrast, CARGs, club and family refills could lead to involuntary disclosure, hence many clients
252 preferred the fast track option to maintain their status discretion.

253 “When there are disputes within the family they will be the ones to disclose your status to the community
254 without your consent” (Male respondent on routine care, Man FGD, Mission hospital)

255 “The model that we are using is fast-track, as for other models like CARGs looking at our community
256 that will not be viable because they will now be knowing that this one is on ART and the word spreads
257 and that’s the thing that they don’t want to be known.” (HCP, RHC)

258 Confidentiality and disclosure issues could lead to DART implementation failures at some HFs, where
259 group models, such as CARGs, were unavailable.

260 “CARGs, we have failed to implement due to issues of disclosure within the patients themselves.” (HCP,
261 RHC)

262 ***Travel and expenses***

263 PLWH highlighted that they were facing challenges with transport money to access healthcare
264 services. Lack of transport money often resulted in long walking distances, which in some instances
265 could affect the utilization of healthcare services. Many PLWH in rural Zimbabwe survive solely on
266 subsistence farming and informal employment. Group DART models allow them to do their
267 responsibilities at home while others collected ART for them. Furthermore, grouped DART models
268 relieved PLWH and caregivers of children who are unable to walk the long distance to the HF as drug
269 refill can be obtained through other PLWH registered within the same group DART models.

270 “Many patients come from far away and transport cost is usually a problem for them” (HCP, Rural
271 Hospital)

272 “We face challenges of transport money” (Female respondent, Breastfeeding and pregnant women FGD,
273 RHC)

In contrast, other women and caregivers of children living with HIV indicated that they preferred CARGs, which they felt would reduce the number of times walked to health care facilities, especially elderly caregivers of children.

“CARGs will do issues of distances, which for some of us are a challenge.” (Caregiver FGD, RHC)

“It helps the elderly because in CARGs, the elderly do not come to the clinic but other members collect for them.” (Women FGD, RHC)

HCPs preferred CARGs over other ART delivery models because they address the issues of transport costs. Models like outreach are a challenge as there are no vehicles to deliver the medications to the designated points and no funds to pay for fuel and HCP out of station allowances. HCPs indicated that implementing the mobile outreach DART model is difficult to implement as there were challenges with costs involved for transportation required to implement this DART model.

“It is because we don’t have the necessary support in implementing the other models, for example, the outreach cannot be implemented since we have no transport vehicle.” (HCP, RHC)

Waiting time

Waiting times experienced by clients were reflecting the workload of HCPs. HCPs indicated that DART models like CARGs, family and clubs refill models had the potential to lessen the work burden at the HF. Most rural HF had only few HCPs attending to large numbers of clients, which contributed to their sentiments of being overwhelmed. Therefore, they stated that there was a need for DART models as they can ease the pressures on the HCPs, decongest the HFs and reduce waiting times. However, some HCPs felt that CARGs increased their workload instead of lessening it as shown below:

“The work is too much especially when we are supplying CARGs for medication” (HCP, RHC)

Clients also expressed their concern towards long waiting times which render clinic visit hard to integrate in their daily life. Clients tended to favor the fast-track model, which allowed them to save time when coming to the clinic for ART refills.

“The long waiting time is a challenge because we will be hungry by the time we walk back and it will be almost evening (Adolescents FGD, Mission hospital, Club Model)

“With fast track you are quickly served and go back home” (Female respondent, Breastfeeding and pregnant women FGD, RHC)

Discussion

In this study, we used a mixed-method approach to assess the availability of DART models in the rural district of Bikita in Zimbabwe in 2019. We wanted to understand the experience of HCPs related to HIV care delivery, as well as the needs and challenges of PLWH related to accessing care. We analyzed data from 26 HFs, including HCPs and a representative sample of PLWH. While 23% of HFs offered routine care only, other HFs offered at least one DART model, most with one or two options available, and one with three. Among the five DART models recommended in Zimbabwe, CARG refill was the most commonly offered, available at half of the HFs, followed by fast-track (31%) and family refill (23%); club refill was available at one district hospital only and mobile outreach was not available in any of the HFs in the region. Interviews among HCPs and PLWHs revealed that confidentiality and fear of disclosure were overarching concerns for PLWH on life-long ART. In addition, access to care was challenged by the cost of transport to the HFs and the long distances between clients' homes and HFs. Long waiting times at the clinic before accessing care services reflected the excessive workload of HCPs and were also critical obstacles to care and influenced the choice of care delivery models. Fast-track refill was generally perceived as the favorite ART delivery model, conciliating privacy concerns with reduced waiting times. CARGs and family refill models were favored by groups of clients among whom there was sufficient trust for privacy.

We showed that the visits at HFs took longer for clients with CARG and family refills compared to routine care. The longer visit duration reflected the fact that one client was responsible for collecting drugs for all members of the group, and also underwent a personal clinical review during the visit. This would be balanced by fewer visits over the year if members of a group model come to the HF in turns. Although the visit duration measured at the HFs were not accounting for the visit frequency, our study did not show any difference in the number of visits per year by model of care. This could be partly explained by recurrent shortages of ART in some HFs. If supplies were insufficient, PLWH received ART refills for shorter periods of time and then would have to come back to the clinic earlier than planned. Drug shortages are common at ART programs in low- and middle-income countries and can affect the convenience of care delivery, as well as adherence and treatment outcomes [14–16]. More frequent visits to HFs for ART refills eventually contribute to the congestion of HFs and increase the workload of HCPs. Group refills and multi-months dispensing have been shown to release the pressure on the health system and contribute to fewer individual visits, while maintaining comparable clinical outcomes compared to routine care [17,18]. We observed shorter visit durations at HFs with larger ratios of clients to staff, which may reflect the consequences of excessive workloads. High patient loads forces HCPs to commit only little time per client, with the risk of undermining the quality of delivered care [19].

Fast-track refill model was associated with shorter visit duration compared to other models and appeared to be particularly convenient for PLWH who can afford regular visits to the HF and who are concerned by privacy issues. However, a recent report among pregnant and post-partum women in South Africa indicated that fast-track services were not necessarily used, even when available. [20] The underuse of some DART models can reflect the preference of some clients for routine care, which provides more face-to-face time and to which they are used.

Travel costs were perceived as one of the barriers towards accessing care at HFs. Long distances can become problematic when clients have to walk to the HF instead of taking faster means of transport because of their higher costs. DART model can offer cheaper alternatives to routine care, if they consisted of fewer visits to the HF per client. In Malawi, DART models reduced time and travel costs to clients compared to routine care, with the shortest visits associated with fast-track and the lowest travel costs with CARGs [21]. Unfortunately, we have not been able to determine the advantages and challenges of the mobile outreach models in rural Zimbabwe, which could be beneficial for remote PLWH and which eliminates travel costs, as none of the HFs offered this model.

Confidentiality and privacy were reported as important criteria for the choice of DART delivery model. Participants felt that grouped DART models would expose their HIV status to the community and interfere with their privacy. The fear of discrimination and stigma associated with HIV can contribute to poor adherence, poor retention in care and can affect the mental well-being on PLWH [22]. Fast-track was a good option for those clients who favored individual models. In contrast, other PLWH preferred family clubs and CARG refill models, which they perceived as comfortable options when trust was built among members, particularly in family clubs. For some clients, CARGs could lead to involuntary disclosure outside the group, which was perceived as too risky.

This study was limited by its small sample size and by the difficulty to recruit a representative stratified sample at small rural HFs, which may limit the generalizability of our findings. Yet, the inclusion of smaller facilities contributed to the understanding of real-life implementation challenges in resource-limited areas where access to HIV care can be difficult. Our study did not assess the fidelity of DART model implementation in rural Zimbabwe, which could have given insights into the decision-making processes underlying the choice of DART models provided and to whom the available models are offered. The strength of our study was to use a mixed-method approach on recently-collected quantitative and qualitative data to gain an in-depth understanding of the needs and challenges along with the implementation of DSD in rural Zimbabwe. The qualitative arm of this study provided in-depth information about topics, which would only superficially or unreliably be captured in standardized questionnaires, especially issues of privacy and stigma.

Conclusions

This study investigated the implementation of DSD in rural Zimbabwe and the preferences and challenges experimented by PLWH and HCPs. Confidentiality was perceived as the main concern of PLWH, followed by travel costs and waiting times. Yet, preferences varied between individuals and not all models might be needed at all HFs. Our study supports the need for personalized care at ART programs in rural Africa and underlines the importance of empowering clients to choose contextually-appropriate DART models, which help to meet their needs as well as create efficiency. The evidence-based identification of the most suitable DART models to implement at each HF and to offer to each client would ensure the most effective use of resources. There is need for more implementation research [23] to guide these decision-making processes, to generate evidence on the acceptability, appropriateness and fidelity of DART models, and to support the continuation of DSD implementation in Zimbabwe.

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Conflict of interest

The authors declare that they have no competing interests.

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468

469 *Table 1. Characteristics of the 26 HFs and availability of DART models.*

	Total (N=26)	Rural Health Centre (N=22)	Rural Hospital (N=2)	District Hospital (N=2)
HF owner				
Council	12	12	-	-
Government	10	8	2	-
Mission	3	1	-	2
Private	1	1	-	-
Number of clients median (IQR)	389 (211-688)	346 (180-433)	994 (881-1106)	1,152 (1,146-1,157)
Client-staff ratio median (IQR)	71 (42-96)	80 (42-96)	107 (84-130)	50 (46-54)
Number of available DART median (range)	1 (0-3)	1 (0-2)	2 (0-3)	2 (1-2)
Available DART model (n)	28	22	3	3
CARG refill	13	11	1	1
Club refill	1	-	-	1
Family refill	6	5	1	-
Fast-track refill	8	6	1	1
Outreach	-	-	-	-

470 Abbreviations: CARG, Community ART Refill Group; DART, differentiated ART delivery; HF, Health

471 Facility; IQR, interquartile range.

Table 2. Characteristics of 378 clients and enrolment on differentiated ART delivery models.

		Overall	CARG refill	Club refill	Family refill	Fast-track refill	Routine care
Number of clients	N=378	378	30	8	7	36	297
Gender (n)	N=378	Female (245) Male (133)	Female (20) Male (10)	Female (7) Male (1)	Female (4) Male (3)	Female (22) Male (14)	Female (192) Male (105)
Age at registration median (IQR)	N=378	41 (32-51)	48 (35-55)	51 (42-66)	45 (38-59)	42 (30-52)	40 (31-50)
Time on ART median (IQR)	N=313	6 (4-9)	8 (7-10)	7 (4-9)	4 (3-5)	6 (4-8)	6 (3-8)
Travel time to HF median (IQR)	N=313	60 (30-120)	45 (30-120)	90 (90-112)	60 (60-105)	52 (29-68)	60 (30-120)
Visits per year median (IQR)	N=313	4 (4-4)	4 (4-12)	5 (4-6)	4 (4-4)	4 (4-4)	4 (4-4)
Time at HF median (IQR)	N=203	27 (16-61)	22 (16-138)	28 (24-30)	91 (72-106)	18 (12-26)	31 (16-62)
Number of services per visit median (IQR)	N=203	2 (2-3)	2 (2-3)	3 (2-4)	3 (3-4)	3 (2-4)	2 (1-3)

Abbreviations: ART, Antiretroviral Therapy; CARG, Community ART Refill Group; HF, Health Facility; IQR, interquartile range.

Figure 1. Linear regression model on time spent in HF. Model adjusted for the enrolment in DART models, level of care of the HF, client-staff ratio, and gender including pregnant/breastfeeding status, and age. Abbreviations: CARG, Community ART Refill Group; CI, confidence interval; DART, differentiated ART delivery; HF, Health Facility, IQR, interquartile range.