

A mixed-methods evaluation of the uptake of novel differentiated ART delivery models in a national sample of health facilities in Uganda

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Abstract

INTRODUCTION

Since 2017, Uganda has been implementing differentiated antiretroviral therapy services (DARTS) to improve the quality of HIV care and health-system efficiencies. The Ministry of Health endorsed five models. The community-based models include Community Client-Led Drug Delivery (CCLAD) and Community Drug Distribution Points (CDDPs), with facility-based models being either Fast Track Drug Refill (FTDR), Facility Based Group (FBG) or Facility-Based Individual Management (FBIM). It is unclear what the uptake of DARTS is since roll-out in 2017. We set out to assess the extent of uptake of DARTS models and to describe barriers to uptake of either facility-based or community-based models.

METHODS

Between August and December 2019, we conducted a mixed-methods study entailing a cross-sectional health facility survey (n=116) and in-depth interviews (n=18) with ART clinic managers in ten case-study facilities as well as six focus group discussions (56 participants) with patients enrolled in DARTS models. Facilities were selected based on the 10 geographic sub-regions of Uganda. Statistical analyses were performed in STATA (v13) while qualitative data were analyzed by thematic approach. The qualitative arm of our study was dominant.

RESULTS

Most facilities 63 (57%) commenced implementation of DARTS in 2018. The most implemented facility-based model was Fast Track Drug Refill (FTDR) implemented in 100 (86%) of health facilities. Community Client-Led ART Delivery (CCLAD) was the most popular community model implemented in more than a half of facilities (63/116 or 54%). Community Drug Distribution Points (CDDP) model had the lowest uptake and was implemented in only 33 (24.88%) facilities. Overall, there has been a higher uptake of facility-based models. Barriers to enrollment in community-based models include; HIV-related stigma and a fear of breach of confidentiality of HIV status, low enrollment of adult males in community models. Health-system constraints include insufficient training of health workers in DARTS and inadequate funding to facilities for implementing community-based models.

CONCLUSION

To the best of our knowledge this is the first study reporting national DARTS coverage in Uganda. There is need to devise stigma-reduction interventions to enhance uptake of community models and increased donor and government funding for community models to maximize DARTS potential for achieving health-system efficiencies.

Introduction

Globally, the implementation of the universal ‘test and treat’ policy has dramatically increased the population in need of anti-retroviral therapy (ART) [1]. In order to meet the escalating demand for ART in resource-limited settings, adaptations in traditional HIV service delivery models have become a global health imperative [2, 3]. Differentiated service delivery (DSD) is a novel adaptation to traditional HIV service delivery models. DSD was endorsed by the World Health Organization (WHO) in 2016 and major global HIV donors such as the President’s Emergency Plan for AIDS Relief (PEPFAR) and The Global Fund with the aim of improving the quality of HIV care and patient outcomes [5]. Additionally, DSD aims at improving health-system and programme efficiencies thereby allowing for an expansion in ART coverage. DSD has been defined as *‘a client-centered approach that simplifies and adapts HIV services across the cascade, in ways that both serve the needs of people living with HIV better and reduce unnecessary burdens on the health system’* [2] DSD is said to comprise some basic elements or ‘building blocks’ [3]. These include appointment spacing of between 3 to 6 months for stable patients, out-of-facility care, and task shifting to non-clinician cadres [3]. DSD holds the immense promise of reducing overcrowding and heavy workloads common at points of care in countries with a high HIV burden [1] – [3].

Since 2016, several countries with a high HIV burden in Sub Saharan Africa (SSA) have been implementing national DSD scale-up programmes. These countries include Malawi, South Africa, Zimbabwe and Zambia [6,7,8,9].

In Uganda, the national ART treatment guidelines of 2016 were updated to provide for differentiated HIV services delivery [4]. Since 2017, the Uganda Health ministry has been implementing Differentiated Anti-Retroviral Therapy Services (DARTS). Uganda has been implementing five DARTS models for the over 1.2 million Ugandans accessing ART [4]. **Figure 1** shows the five DARTS models currently in implementation in Uganda. Of these, four are less-intensive models catering for stable patients. These include; i) Fast Track Drug Refill (FTDR) that entails receiving 3-6 monthly ART refills-only, ii) Community Client-Led ART Delivery (CCLAD) where voluntary groups of six patients rotate in picking up ART medicines refills for each other from facilities iii) Community Drug Distribution Points (CDDPs) where outreach sites within communities are designated for ART refill pick-ups and iv) Facility Based Group (FBG) where patients form adherence support clubs [4]. Facility-Based Individual Management (FBIM) is synonymous with the default traditional facility-based model of HIV care that was undifferentiated to the needs of individual patients. Enrolling patients in less-intensive treatment models is a top priority in over-burdened health systems in Sub-Saharan Africa including Uganda [8].

It is unclear what the uptake of the different DARTS models has been at health facilities across Uganda [11]. Many previous studies have examined early implementation barriers in the national scale-up of DARTS in countries with a high HIV burden especially those with weak health-systems [6], [7], [10]. However, data on the national coverage of these novel service delivery models such as the proportion of health facilities implementing differentiated ART models are sparse [11, 13]. Understanding the service coverage of differentiated ART delivery models is vital in HIV programming and planning in terms of identifying gaps in service coverage, assessing demand for particular DARTS models and understanding patient preferences as well as addressing implementation barriers to enable further DSD scale-up [1], [11].

These data are essential to inform decision making by national-level HIV program managers, funders, providers and frontline health workers in countries rolling out DARTS [13]. Additionally, DSD has gained an increased importance in the context of the Covid-19 pandemic with a number of countries leveraging these models to deliver six-month ART refills to patients held up by 'lockdown' measures for averting spread of Covid-19 [33, 34]. Several studies have called for assessments of the uptake of DSD in countries implementing national scale-up programs [1, 5, 11, 12]. We set out to assess the extent of uptake of novel DARTS models at health facilities in Uganda and to qualitatively explore reasons for variations in uptake of facility-based versus community-based DARTS models.

Materials And Methods

Research design

We utilized a mixed-methods sequential explanatory research design [14]. This study was conducted in two phases which were implemented sequentially [15]. In Phase I we conducted a cross-sectional health facility survey to assess the extent of uptake of DARTS in a national sample of health facilities across Uganda. Phase II entailed a qualitative multiple case-study of ten health facilities to explore reasons for variations in uptake of facility-based versus community-based DARTS models. The qualitative component of our mixed-methods study took overall priority [14]. This is because we aimed to understand the uptake of DARTS models from the perspectives of patients and providers given their contexts and health-system setting(s) [16].

Study sites and sample selection

Phase I

The units of study were Ministry of Health- accredited ART-providing facilities in Uganda [17]. Sites were selected based on the 10 geographic sub-regions of Uganda as defined by the Uganda Bureau of Statistics [18]. Because ART client loads are highest at the tertiary level of care in Uganda [17], we selected all Regional Referral Hospitals (RRH) and district hospitals in the 10 sub-regions of Uganda. We then randomly selected Health Centre IVs (sub-district facilities) and Health Centre IIIs (sub-county facilities) [17] in each of the sub-regions whilst ensuring diversity by ownership-type (private/ public) and by setting (rural/urban). The number of health Centre IVs and Health Centre IIIs selected in each of the sub-regions of Uganda was based on Probability Proportional to Size (PPS) sampling [17, 19].

Phase II

We adopted a qualitative multiple case-study design [20]. We purposively selected one health facility in each of the 10 sub-regions of Uganda [18]. Table 1 shows the demographic characteristics of participants at case-study facilities. The qualitative phase of the study aimed at gaining an in-depth understanding of the reasons for variations in uptake between facility-based and community-based DARTS models [20].

Data collection

Phase I

A standardized, structured questionnaire was fielded to the ART clinic manager in each of the 116 health facilities. Our paper-based, 35-item questionnaire was researcher-administered, on-site, at each of the participating health facilities. Data were collected between September and November 2019.

Phase II

We conducted sixteen in-depth interviews (IDIs) with ART clinic managers and their staff in ten case-study facilities to understand facility-level operational contexts [21] that potentially influenced uptake or demand for either facility-based or community-based DARTS models. We conducted six focus group discussions (FGDs) with fifty-six patients enrolled in DARTS models. Three FGDs were conducted with patients enrolled in community-based DARTS (Figure 1) for at least a year. For patients enrolled in facility-based DARTS, we conducted three FGDs with patients enrolled in each of the three facility-based models (DARTS) for at least one year. Data were collected between December 2019 and February 2020. Interviews were audio-recorded with the permission of the FGD participants. A team of four research assistants conducted the interview, with one responsible for putting the questions to the participants, while another person observed the participants, took notes and operated the recorder.

Data Analysis

Phase I

Data generated from the health facility survey instrument were cleaned, edited and initially entered into EpiData software (version 3.1) [] and later exported into STATA (version 13) (College Station, TX, USA) for descriptive analyses that included frequency counts and percent distributions. Bivariate analyses were performed (at $p < 0.005$ significance).

Phase II

Qualitative data were analyzed by thematic approach [22]. The audio-recorded interviews and focus group discussions were transcribed verbatim. Our qualitative data analysis approach followed an iterative process [22]. We followed four major steps in data analysis: a) *Data familiarization*: As a first step, the transcripts were read multiple times (by HZ, WN & RS) b) *Development of a coding framework*: In the second stage, a descriptive coding scheme was inductively generated by HZ, WB & RS from multiple readings of the interview transcripts. The joint codebook was validated by a 4th reader. c) *Abstraction of coded data into thematic categories*: In the third stage, the emergent codes were then abstracted into thematic matrices [23]. d) *Interpretation and overall synthesis*: The fourth stage involved overall interpretation and synthesis involving all the authors [23].

Mixed-methods integration

Our quantitative and qualitative data were merged during the phase of overall interpretation and synthesis of study findings [14]. To this end, findings from each of the two data sets were placed side by side as we sought convergence in answering the study objective [15]. The quantitative and qualitative data are presented alongside each other under the emergent sub-themes described in the “Results” section.

Ethical clearance

This research received ethical approval from Mildmay Uganda Research Ethics Committee (MUREC) under instrument: REC REF 0408-2019. MUREC is accredited by the Uganda National Council of Science and Technology (UNCST). All participants signed a written consent form before participating in the study.

Results

Characteristics of participating health facilities

Overall, 116 health facilities across Uganda were included in the study. In terms of ownership-type, the majority 68 (58.62%) were public facilities while 27 (23.27%) were private not-for-profit (PNFP) and 21 (18.10%) were private for-profit (PFP).

With regard to level of care in the Ugandan health system [17], most participating facilities (34/116 or 34.46%) were Health centre IVs (sub-district facilities) followed by Health centre IIIs (sub-county) (31/116 or 31.36%) and general hospitals were 24 (24.55%).

By setting, the majority of health facilities (69 or 61.69%) were based in urban settings compared to 43 (38.39%) health facilities located in a rural setting.

In terms of HIV client loads, the majority of health facilities (75/116 or 68.81%) had at least 500 or more active ART clients compared to 34 (31.19%) health facilities which reported having less than 500 active ART patients.

Characteristics of respondents

A total of 116 ART clinic managers participated in this study. In terms of gender, 51% (59/116) were males while 49% (57/116) were females. More than a half of all respondents (54%) were in the 30-35 age range.

The overall mean work experience of respondents was 8 years (1–20).

In terms of health worker cadres, Clinical Officers at 40 (34.1%) were the most represented, followed by nurses at 37 (31.8%) and physicians at 24 (21.1%).

Year when DARTS was first implemented at participating health facilities

Figure 2 shows that most of the health facilities (63/116 or 57%) commenced implementation of DARTS models in 2018. However, our qualitative data from facilities implementing DARTS models revealed that ART clinic managers perceived differentiated ART as not an entirely new service delivery innovation and that they had been informally implementing some models (such as 3-monthly appointment spacing) prior to the release of formal national ART guidelines designating them as such in 2016.

'We were already doing differentiated service delivery even before the term was coined as such. That term (DSD) came in around 2014 but DSD has been with us for such a long time. We were already doing three-month refills long before this became part of formal guidelines or a systematic way of implementing it was developed. DSD is not new. What is new is the terminology used.'

[ART clinic in-charge, PNFP-01]

Proportion of health facilities implementing DARTS

The majority of health facilities 100 (86%) were implementing at least one DARTS model. As **Figure 3** shows, there has been a higher uptake of facility-based DARTS when compared to community-based models. The most implemented facility-based DARTS model was the Fast Track Drug Refill (FTDR) model. FTDR was reported to be in implementation in 100 (86%) of health facilities in our sample.

Community Client-Led ART Delivery (CCLAD) was the most popular community-based DARTS model implemented in more than a half of all health facilities 63 (54%). Overall, Community Drug Distribution Points (CDDP) had the lowest uptake at 33 (24.88%) of all DARTS models.

Across our in-depth interviews with ART clinic managers it was revealed that the CDDP model was widely perceived as costly to implement. While the CCLAD model entailed self-forming patient groups primarily financed by contributions from individual members such as sharing transport costs for picking ART refills, the Community Drug Distribution Points (CDDP) model depended substantially on the resource envelop of the hosting health facility. Donors supporting the CDDP model in some participating facilities were reported to have discontinued funding due to escalating operational expenses. The costs required for running CDDPs were identified. These include fuel for transporting ART refills into communities, monetary field allowances for facility-personnel during visit to communities and the costs of maintaining the physical infrastructure in the community hosting the drug pick-up points.

"We have some community approaches that are expensive such as CDDPs because the hospital has to foot the transport costs for ferrying ART refills into rural, remote outreach posts. With the CCLAD model there is no added expense on the health system. It is the patients meeting the costs of transport for picking ART refills from hospitals" [National-level HIV program manager, Ministry of Health].

High-volume sites or those with 500 active ART clients or more, were implementing the CCLAD model more than low-volume HIV clinics or sites which had less than 500 active clients ($p < 0.001$).

Characteristics of health facilities implementing all five DARTS models

Overall, only 25 facilities (21.55%) were implementing all five DARTS models recommended by the Ministry of Health of Uganda. The characteristics of the 25 health facilities are represented in **Table 1**. This table shows that almost half (48%) of the facilities reporting implementation of all five DARTS models were private not-for-profits (PNFPs) the majority of which had a faith-based foundation. More than half of the 25 health facilities were general hospitals while a quarter of them were Regional Referral Hospitals (RRHs). This may suggest that DARTS uptake is highest at the most advanced level of care in the Ugandan health system (tertiary and secondary levels).

Uptake of DARTS by ownership-type of health facility

We found variations in uptake of DARTS by ownership-type of a health facility. Overall, Private for-profit (PFP) health facilities reported the lowest uptake of DARTS models across ownership-type of facility. Out of the 21 private for-profit facilities in our sample, only a third had implemented DARTS models at all. In contrast, 67% of all public and 52% of all Private not-for-profit (PNFPs) commenced DARTS implementation in the year 2018 alone. The year a health facility started implementing DARTS models and ownership-type of health facility are significantly related ($p = 0.001$).

Our qualitative data provided insights into why there was relatively low uptake of DARTS models in private for-profit facilities. Participants from for-profit facilities reported that their health workers had not been trained in differentiated ART delivery even when their counterparts in public and not-for-profit facilities were being trained by PEPFAR implementing organizations and the Uganda government at no charge as highlighted in the quote below:

'No training in differentiated HIV services has been done for our staff in private hospitals. They always tell our staff to pay when attending training by the Ministry of Health. Private hospitals have to dig into their pockets to pay for training of health workers yet this is free for public and not-for-profits. But we don't have a budget for that' [ART clinic in-charge, PFP-06].

Interviews with national-level HIV program managers at the Uganda Ministry of Health and district health team leaders revealed that donors in Uganda prioritized public and for-profit facilities because these had the highest HIV client loads and hence donors perceived their investments to have 'a higher yield' there. As such, it emerged from this study that for-profit (PFP) facilities were not being prioritized in the national scale-up of differentiated ART delivery across Uganda and that health workers in this category of health facilities had not been trained on how to offer DARTS models.

High-volume facilities (those with 500 or more active ART clients) implemented a more diverse mix of models across both community (mainly CCLAD) and facility-based (principally FTDR) models compared to low-volume facilities (those with less than 500 active ART clients) which exclusively implemented facility-based (principally FTDR) models ($p = 0.001$).

Understanding the relatively low uptake of community-based models

Overall, the uptake of community-based models was less than that of facility-based models. **Figure 4** shows that facility-based models have received more demand from patients when compared to community-based models according to majority of respondents (85.0%).

Our qualitative findings shed light on why this was the case. Participants attributed the relatively low demand for community-based models to HIV-related stigma. Patients were said to be filled with fear of unintentional disclosure of HIV status or plainly, being known to live with HIV, by peers living in the same neighborhoods if they joined patient groups such as CCLADs.

'Patients do not actually like the community models because of stigma, especially CCLADs which involves forming groups of six patients living in the same community. That means all the patients in the group know each other and reside in the same neighborhood. But patients will tell you "I do not want the other person to know that I am sick and get (HIV) care from this facility' [ART clinic manager, PF-03].

Rural-urban differences in DARTS uptake

Rural-based facilities implemented the Community Client-Led ART delivery (CCLAD) model (67.4%) more than urban-based facilities (42.0%) ($p < 0.001$). The latter category of facilities reporting a more even uptake of both community and facility-based models (such as Fast Track Drug Refill at 44.9%).

In-depth interviews with ART clinic managers revealed that urban patients were sophisticated and that they tended to prefer individualized facility-based care due to their need for privacy and the convenience offered there.

'Patients in urban settings like Kampala (city) do not want to form community groups. They just want to go to the facility, get their drugs and go home, or go to a point somewhere, get their drugs and go home. Patients in towns are not interested in forming groups. They are interested in convenience and saving time. They just want to go to a nearby pharmacy, pick their drugs and in ten minutes get out' [ART clinic manager, PUB-04].

Our qualitative findings also suggest that there is a section of patients who prefer regular face-to-face interactions with health workers and the psychosocial support and satisfaction derived in standard clinic-based care. There was a perception among some patients that enrolling in community-based models entails, to some degree, a dis-engagement from the formal health system which offers some insight into understanding patient preferences and the outcomes of uptake of varied DARTS models.

'Community models are good because they reduce transport costs and allow us more time at work but for me, as an individual, I want more of that psychosocial service... that personal touch by a health worker. That physical interaction. Because if you are not at the facility you don't get that (individual) attention and care and that is why I prefer to come here on a regular basis' [Focus group discussion with patients, PNFP,003].

On the other hand, several patients in rural-based facilities expressed satisfaction in community-based models owing to the savings in time in seeking facility-based care and the significant reduction in travel costs associated with being enrolled in ART refill pick-ups from outreach sites within the community (CDDPs). Patients enrolled in the CCLAD model appreciated the opportunity of sharing transport costs with peers for ART refill pick-ups from facilities.

Gender dimensions in uptake of community models

Interviews with ART clinic managers revealed gender dimensions in the uptake of community-based DARTS models. Across six case-study facilities it was consistently reported that the majority of the members of Community Client-Led ART delivery (CCLAD) groups were adult women and that adult men had not taken as active an interest in enrolling in CCLADS groups when compared to women.

'We are noticing some gender dynamics in uptake of community models. Most of the CCLAD groups we have here are made up of mainly women. Men have shunned these groups. The most active within these groups are actually women who are loyal to their groups and they are consistent in them' [ART clinic in-charge, PUB-02].

The most practical DARTS model to implement in the assessment of ART clinic managers

We asked health facility staff to mention the most practical DARTS model to implement in terms of one that required the least material resources and health worker in-put at the facility-level.

Figure 5 shows that the majority of them (64.9%) selected Fast Track refill (FTDR) as the most practical DARTS model to implement in terms of requiring the least resource in-puts ($p < 0.001$).

Our qualitative data, particularly through interviews with ART clinic managers, offered keen insights into understanding why FTDR was selected as the easiest DARTS model to implement.

'The Fast Track Drug Refill (FTDR) model has had a high success rate with us. This is good because it is the easiest to implement at the facility-level in my opinion. The guidelines are very clear, you conduct two viral load tests and if the patient is stable in the two instances, you then extend their appointments by 3-6 months. It is that easy' [ART clinic in-charge, PNFP-02].

In contrast, ART clinic managers contended that community-based DARTS models (such as community drug distribution points) were relatively expensive to implement and yet facilities had not received adequate funding and resource facilitation from leading donors such as PEPFAR and the Uganda government to implement them.

Discussion

Although differentiated ART delivery have been implemented nationally in several countries with a high HIV burden since 2016, there is a paucity of data on the extent of uptake of these novel service delivery

models. We set out to assess the extent of uptake of DARTS models at health facilities in Uganda and to understand reasons for variations in uptake between facility-based and community-based models of service delivery.

Preference for facility-based models

In the present study, we found that the Fast Track Drug Refill (FTDR) was the most implemented less-intensive DARTS model in our sample of health facilities in Uganda. Additionally, the majority of ART clinic managers selected this model as the most practical to implement in terms of requiring lower resource in-puts for implementation. A study in Zambia reported that visit spacing (the equivalent of FTDR in Uganda) was rated as the most important element of DARTS by patients [9]. In our study, health facilities indicated that facility-based DARTS models had a higher demand from patients compared to community-based models. Our finding adds to the accumulating evidence base pointing to patient preferences for facility-based individualized ART services [8], [10], [37]. Another study by Rabkin and colleagues in Zimbabwe reported that patients preferred facility-based individualized care in a discreet choice experiment they conducted [8].

Relatively low uptake of community models

Overall, our findings indicate a relatively low uptake of community-based DARTS models. Although previous studies point towards a trend of patient preference for facility-based HIV care [8], [10], [37], our qualitative findings suggest that there is an interaction between *demand-side* and *supply-side* barriers to patient enrollment in community DARTS models [16]. From a *demand-side* dimension, HIV-related stigma and the fear of breach of confidentiality of HIV status by patients were identified as barriers to enrollment in community models. From a *supply-side* dimension, providers indicated that PEPFAR implementing organizations in their geographic sub-regions in Uganda had not provided them with sufficient funding to enable them implement community models such as community drug distribution points (CDDPs). CDDPs may have had the least uptake due to the considerable financial and logistical investments needed to implement them and the fact that the model is intended for hard-to-reach populations such as by patients living on islands in Uganda. CDDPs were perceived to be relatively expensive to implement as they required fuel to transport health workers into the community and off-site monetary allowances. This may point to the need for further research on the relative cost-effectiveness of DARTS models currently in implementation in Uganda. A study by Sharer and colleagues [7] in South Africa reports that limited financial and human resources are impediments in the scale up of differentiated ART delivery models. Another study from South Africa highlights these barriers to the roll-out of community-based outreach points for ART refill pick-ups [28]. However, Community-based ART delivery mechanisms are gaining increasing importance in the context of 'lock down' restrictions imposed as part of Covid-19 prevention measures [33], [34]. Therefore, they are inevitable for the future and all efforts to mitigate clients' individualized fears and supply-side concerns need to be addressed to enhance uptake and demand for community models.

On a policy and programming note, our study reveals a need for devising interventions for stigma reduction as well community engagement with recipients of care aimed at increasing uptake of community models through sustained sensitizations [26], [27]. In addition, an interesting explanatory finding of the low uptake of community-based models is the desire by clients to see a health worker in person regularly. It suggests that HIV clients have a strong need for psychosocial support which, perhaps, was under-appreciated in the design of current DARTS models in Uganda. There is need to enhance this aspect so that even stable patients who receive their ART refills from the community can feel confident that they are fully taken care of. Our study is one of the first to suggest a gender dimension in the uptake of differentiated ART delivery models especially with regard to the notion of women being more represented in voluntary patient groups of rotating ART refill pick-ups. However, gender dimensions have been previously observed, broadly, in trends in seeking HIV care and ART adherence including observations of the intersection between stigma and gender [35], [36].

Our findings emphasize the need for protecting patient privacy in HIV service delivery, the need for training health workers in maintaining patient confidentiality, and the need for further community engagement drives for combating HIV-related stigma. Although there exist several health policies in Uganda relating to combating HIV-related stigma they remain largely on paper. There is an urgent need for their fully operationalize these policies order to empower people living with HIV to live positively. Continued preference for facility-based DARTS models could perpetuate current health-system inefficiencies manifested in overcrowding at facilities and heavy workloads for health workers both of which may negate the intended purpose of DSD.

Low DARTS uptake in for-profit facilities

An important finding of this study was that for-profits (PFPs) had the lowest proportion of facilities implementing DARTS models in Uganda. Our findings revealed that leading HIV donors and the Uganda government have not prioritized for-profits in the national scale-up programs for DARTS roll-out. Health workers in PFPs are not included in health worker training in differentiated ART delivery. Previous studies have highlighted the perception by leading HIV donors that public facilities constitute a better 'investment' option due to higher HIV client loads and therefore a better 'yield' in donor investments [29], [30]. Our study suggests that for-profits have been left behind in DARTS roll-out across Uganda and there is a need for interventions aimed at co-opting for-profits facilities in the quest for the national scale-up of DARTS models. Private facilities constitute more than a half of all health care providers in Uganda and they are the preferred first point of interface with the health-system for the majority of Ugandans [29], [30]. Moreover, Uganda's national policy on Public-Private Partnership for Health (PPPH) considers for-profit providers as essential partners in service delivery [38]. Therefore, there is a pragmatic need to include health workers in for-profit facilities in trainings on differentiated ART delivery, as well as on-site support supervision for successful implementation. Previous studies on differentiated ART delivery models have not included for-profit health facilities in their study populations, a gap we address in this study.

Scope of DARTS models

In this study, we found that only 25 facilities (21.55%) were implementing all the five DARTS models recommended by Uganda' Ministry of Health. Many of the facilities with the highest uptake of DARTS models were at the tertiary level of care in the Ugandan health system (such as Regional Referral Hospitals). This trend is suggestive of a need for remedial measures for further DARTS scale-up targeting health facilities at the primary care level such as at sub-district health centres in Uganda which have high HIV client loads and where DARTS models offer promise for decongestion and reduction in health worker workloads. Almost all the private not-for-profits (PNFP) implementing community-based DARTS models in our sample were faith-based or mission hospitals. Our study adds to the literature recognizing the contribution of mission hospitals in strengthening community health systems in Sub-Saharan Africa [31], [32].

Conclusion

This is one of the first studies reporting the extent of uptake of differentiated ART delivery in a national sample of health facilities in Uganda. The majority of health facilities were implementing at least one less-intensive DARTS model. Facility-based DARTS models have had a higher rate of uptake in participating facilities. Barriers to uptake of community-based models include HIV-related stigma, insufficient funding and a preference by patients to see a health worker in person on a regular basis. Psychosocial support for clients needs to be strengthened at all levels of the delivery system so that clients do not feel that it can only be provided at facility level. Specific Interventions are also needed to promote the uptake of DARTS in private for-profit health facilities in Uganda which have the lowest coverage.

Declarations

Competing Interests:

The authors declare no competing interests.

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Tables

: Characteristics of health facilities implementing all five DARTS models

ONYM	OWNERSHIP-TYPE	LEVEL OF CARE IN UGANDAN HEALTH SYSTEM	SETTING	GEOGRAPHIC SUB-REGION [11]	CUMMULATIVE ART PATIENT LOAD (As of September 2019)
-001	PUBLIC	Referral Hospital	Urban	Southwest	11,026
-002	PUBLIC	Referral Hospital	Urban	Western	4,542
-003	PUBLIC	Referral Hospital	Urban	West Nile	6,700
-004	PUBLIC	Referral Hospital	Urban	North	12,495
P-001	NOT FOR PROFIT	Referral Hospital	Urban	North	5,447
-005	PUBLIC	General Hospital	Urban	Western	2,610
-006	PUBLIC	General Hospital	Rural	Central 2	1,549
-007	PUBLIC	General Hospital	Rural	West Nile	2,402
-008	PUBLIC	General Hospital	Rural	Central 2	5,349
-009	PUBLIC	General Hospital	Rural	Eastern	769
P-002	NOT FOR PROFIT	General Hospital	Urban	East Central	7,452
P-003	NOT FOR PROFIT	General Hospital	Urban	Kampala	1084
P-004	NOT FOR PROFIT	General Hospital	Rural	Western	3,518
P-005	NOT FOR PROFIT	General Hospital	Peri-urban	West Nile	1,035
P-006	NOT FOR PROFIT	General Hospital	Peri-urban	Southwest	2,603
P-007	NOT FOR PROFIT	General Hospital	Peri-urban	North	8,003
P-008	NOT FOR PROFIT	General Hospital	Peri-urban	Central 1	1,070
P-009	NOT FOR PROFIT	General Hospital	Urban	Central 1	3,542
-010	PUBLIC	Health centre IV	Peri-urban	Central 1	1,078
-011	PUBLIC	Health centre IV	Rural	Central 1	1,243
-012	PUBLIC	Health centre IV	Rural	Southwest	1,780
-013	PUBLIC	Health centre IV	Peri-urban	Central 1	1,586
-010	NOT FOR PROFIT	Health centre IV	Rural	Central 2	2,006
P-011	NOT FOR PROFIT	Health Centre IV	Rural	Central 1	2,578
P-012	NOT FOR PROFIT	Health Centre III	Urban	Central 1	651

Figures

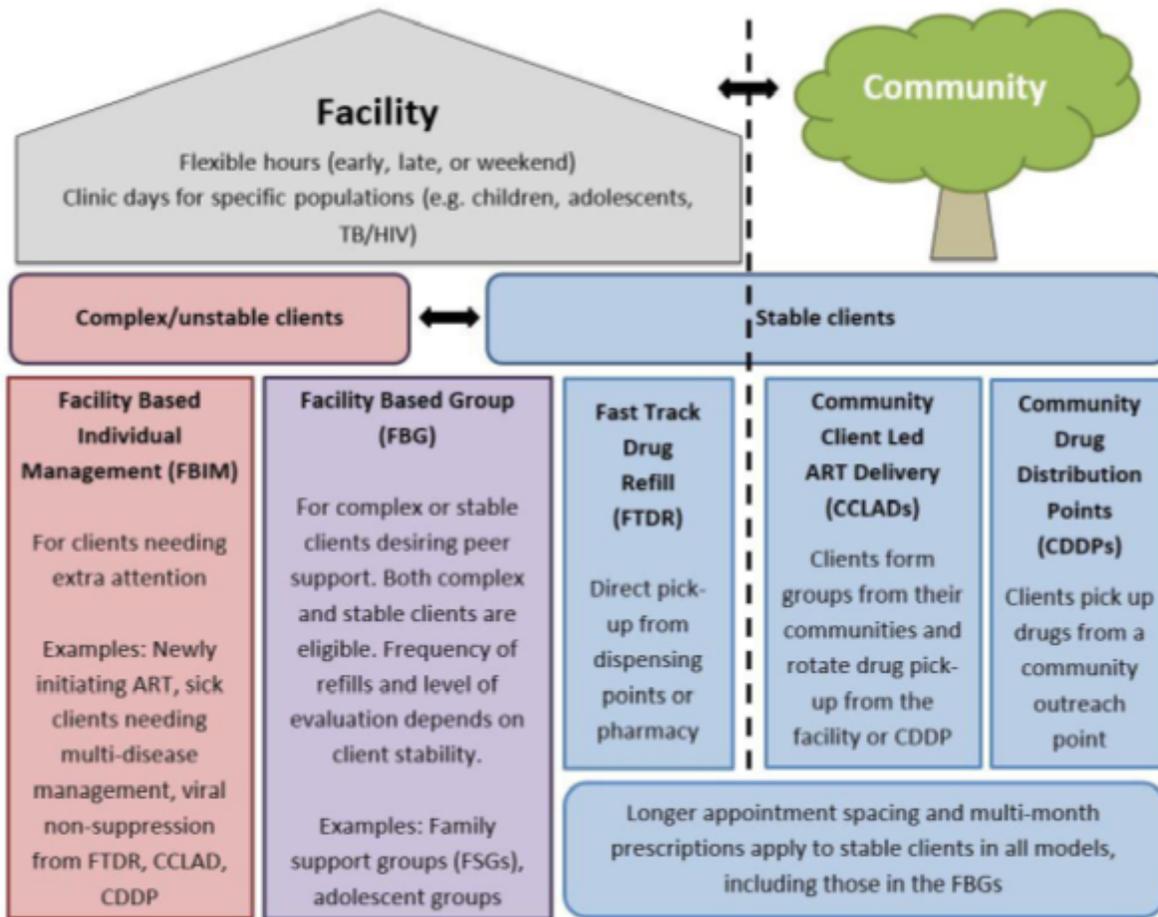


Figure 1

The five DARTS models in Uganda

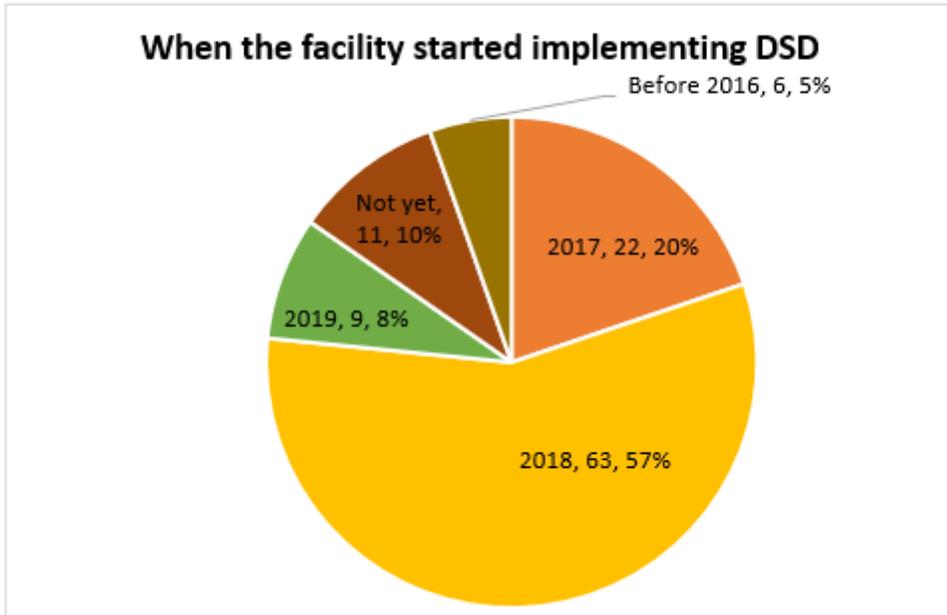
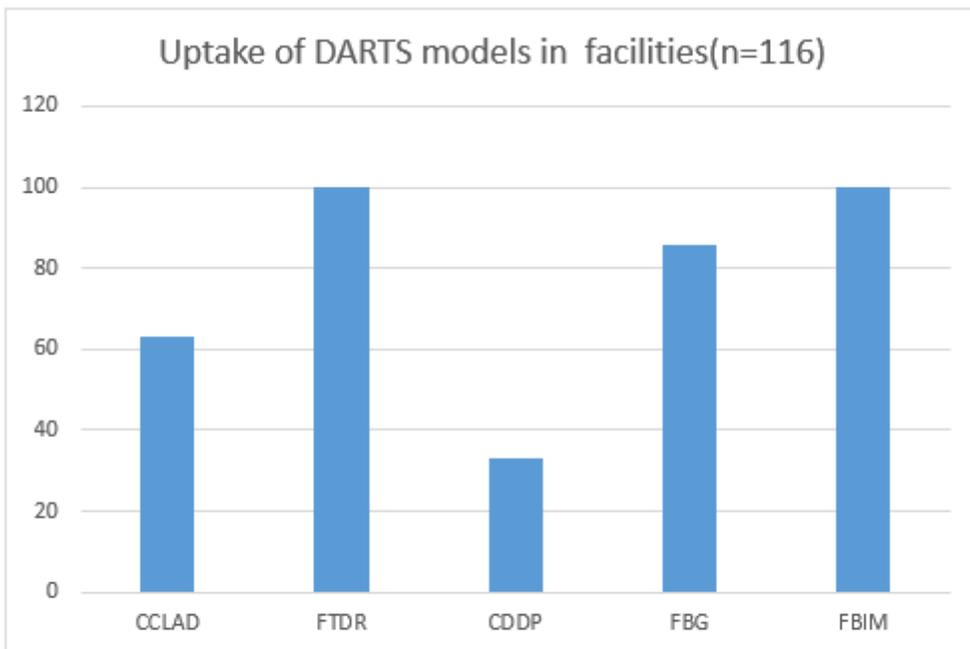


Figure 2

Year when facilities started DARTS implementation



CCLAD: Community Client-Led ART **FTDR:** Fast Drug Refill **CDDP:** Community Drug Distribution Point

FBG: Facility Based Group **FBIM:** Facility Based Individual Management

Figure 3

Uptake of DARTS by individual model

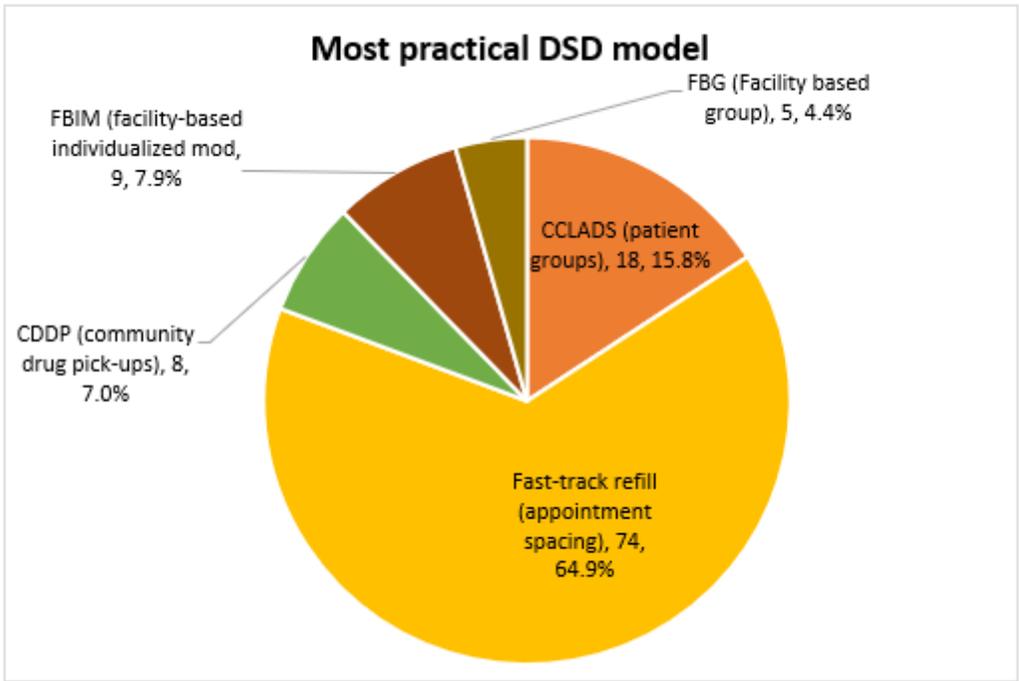


Figure 4

Most practical DARTS model to implement

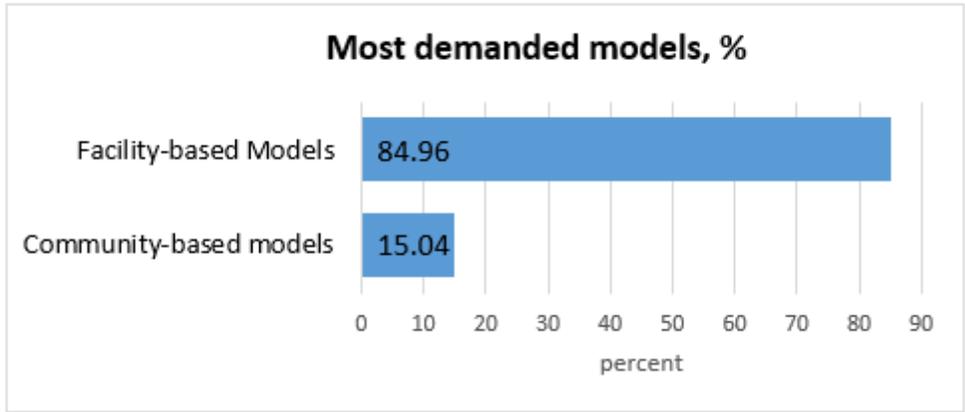


Figure 5

Demand for DARTS models by patients