

Differentiated service delivery for families - children, adolescents, and pregnant and breastfeeding women: A background review

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List of acronyms used

ANC	Ante-natal clinic
ART	Antiretroviral therapy
ARV	Antiretroviral
CAC	Community Adherence Club
CAG	Community ART Group
CATS	Community Adolescent Treatment Supporters
C-BART	Community-based ART
CBAS	Community-Based Adherence Support
CDC	Centers for Disease Control and Prevention
CROI	Conference on Retroviruses and Opportunistic Infections
DOH	Department of Health
DSD	Differentiated service delivery
EGPAF	Elizabeth Glaser Pediatric AIDS Foundation
FP	Family planning
HCW	Health care worker
LHCW	Lay health care worker
M2M	Mothers2mothers
MCH	Maternal and child health
MIP	Mother-infant pairs
MMP	Multi-month Prescription
MOH	Ministry of Health
MSF	Médecins Sans Frontières
PBFW	Pregnant and breastfeeding women
PHC	Primary health clinic
SOC	Standard of care
SOP	Standard operating procedure
SPEEDI	Standardized Paediatric Expedited Encounters for ART Drugs Initiative
VL	Viral load
WC	Western Cape
WHO	World Health Organization

Part 1. Introduction

Differentiated service delivery (DSD) is a client-centred approach to patient care focused on the preferences and expectations of people living with HIV (1). The approach is aimed at offering less intensive services to those who are stable on antiretroviral therapy (ART); this minimizes the time they spend accessing health services and, at the same time, refocuses health system resources on clients who require more intensive care and follow up. Although there are many examples of DSD models for adult clients who are stable on ART, there is limited understanding of how a differentiated care approach could or should be applied to specific populations, including families. In this review, the term, “families”, encompasses adolescents, children, and pregnant and breastfeeding women (PBFW) living with HIV.

A family approach is considered important for offering comprehensive support for the aforementioned specific populations. The outcomes for children and adolescents living with HIV are influenced by their family environment, which affects their psychological and social wellbeing and their overall development (2). Supportive caregivers are also critical to the provision of adequate care for children and adolescents living with HIV as they often require social support to manage their disease. PBFW can also benefit tremendously from support from their partners and family members; the path from HIV diagnosis to initiation of lifelong treatment during the pregnancy and through to the care of their infants can be overwhelming. A family-centred approach could thus address some of these challenges. It could support improved functioning of the family unit, enable good clinical outcomes for family members living with HIV (3), and improve efficiency and decrease costs for families and health systems. Some examples of a family approach could include families receiving same-day appointments, providing all family members with the same length ART refills or allowing one family member to collect ART refills for the rest of their family members who are stable on ART.

This review seeks to summarize the available information on DSD models that are in place and target the specific populations included under “families” to support the development of a DSD framework for implementation. In order to design an effective framework, the needs, constraints and barriers of families must be understood. It is important to define the parameters for clinical stability for each specific population and the process for referral to the DSD model. It is also important to describe the services to be provided through those models, as well as the processes for transition out of the DSD model should clients require more intensive care. The application of DSD to families in settings with low HIV prevalence, where health system and client challenges may differ from high-prevalence settings, should also be considered. This paper briefly outlines the key issues to consider for differentiated care for families, describes currently available DSD models, and concludes with areas for consideration to further the development of a DSD framework.

Part 2. Key issues in differentiated service delivery for children, adolescents and pregnant and breastfeeding women

Children

Children living with HIV present unique challenges as they experience physical and cognitive growth when moving from infancy through childhood, which at times requires modification of clinical care and implementation of approaches for psychosocial support and disclosure (4). Globally, treatment coverage among children is lagging and, once on treatment, adherence and retention in care is poor; a systematic review found that on average only 67% of children are retained in care 36 months after ART initiation (4,5). These facts are even more concerning given that children living with HIV are at higher risk of worse outcomes and mortality than their adult counterparts (6). Because of children's reliance on adults, the involvement of caregivers is essential to ensure good adherence and retention. Caregivers who themselves are living with HIV but who are either not receiving ART or not adherent to treatment may also influence sub-optimal care for their children due to their consequent sickness. These caregivers living with HIV also require psychosocial support for themselves and to assist them in disclosing to their children living with HIV. Additionally, children who are studying away from home may need support to address the psychosocial stressors experienced with frequent changes in caregivers, some of who may not be fully vested in ensuring the wellbeing of the children they oversee. Addressing these stressors with support services should also improve adherence and retention in care.

Administration of antiretroviral (ARV) medication has also been found to be a challenge in children, particularly infants, as this population in general has difficulties taking medication. This issue is further compounded in HIV treatment by current dosing regimens which are at times complex and must be administered accurately (4). This potentially makes it more trying for lower cadres of health workers to manage ART delivery for children, notwithstanding the recommendation by the World Health Organization (WHO) that a lay health worker can prescribe and distribute ART for children provided they have received specific and adequate training (4).

The age-specific clinical issues found in managing children living with HIV may require more intensive follow up. The rapid growth of children seen in the first two years of life makes it essential to monitor weight frequently and to adjust weight-based ARV doses as needed (4). After two years of age, however, dose adjustments may only be required twice more until a child reaches 10 years of age, as reflected in Figure 1 (7). This implies that longer ART refills for children, or multi-month prescriptions, are possible within differentiated service delivery for children. Additionally, the rapid weight gain that children experience when first initiated on ART levels off (8,9), which could justify developing an eligibility criteria for children based on weight stability for entry into a DSD model.

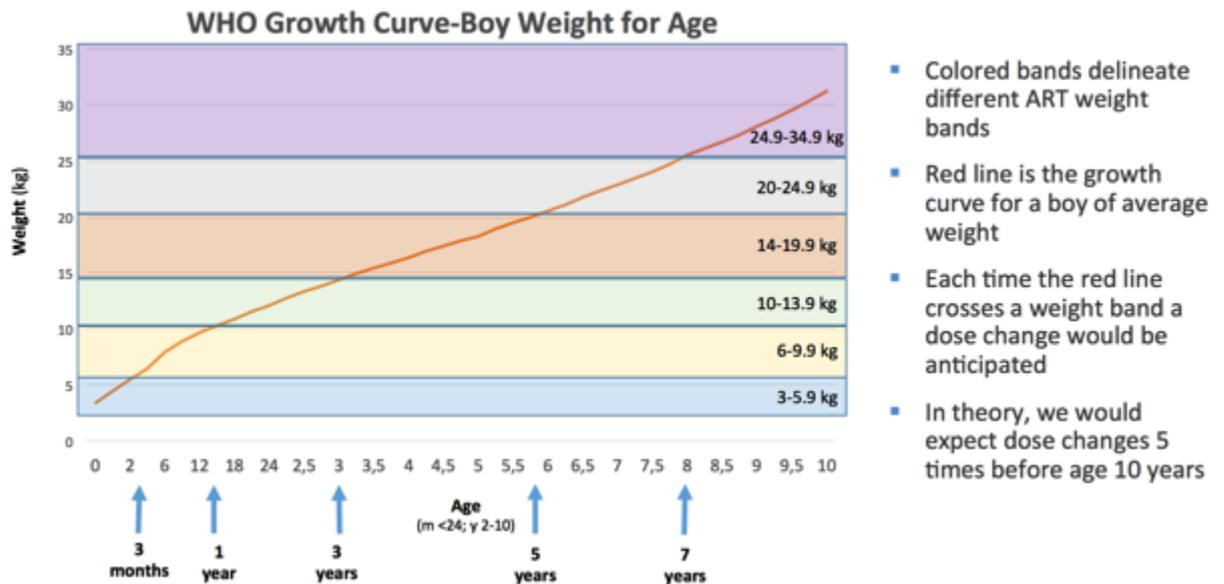


Figure 1: Expected dose changes for children based on weight
(Courtesy of Kelsey Mirkovic, Centers for Disease Control and Prevention, Atlanta)

For children who have achieved viral suppression, annual viral load measurement has been shown to be sufficient for monitoring treatment outcomes (10). The WHO recommendation of viral load monitoring every 12 months after the first year on treatment is the same for stable children as for stable adolescents and adults. DSD models that include children may have to consider whether any other red flags should be monitored to identify when more intensive support from a clinician is required; they would then need to have systems in place to transfer children back to facility-based care when indicated (11).

Adolescents

Adolescents living with HIV often have varying needs distinct from other ages groups: during this time, they undergo rapid physiological, psychological and behavioural changes (12,13). They generally experience worse clinical outcomes compared with adults and are at higher risk of being lost to follow up (14,4). A systematic review looking at adolescents on ART found that adherence levels to ART of 95% or above was only achieved in 62% of adolescents and young adults (15).

Adolescents often face a variety of difficulties engaging in care. Barriers include lack of awareness of both their health needs and the services available, lack of effective means to discuss their concerns about their disease, limited family support and lack of funds for transport to health facilities (4). At times, they also face socio-economic challenges and stigma from peers (12,16). Frequent visits to health facilities are also challenging as adolescents are more likely to have rapidly changing schedules. Adolescents also face barriers at health facilities, including long wait times, negative health worker attitude and, at times, limited privacy (4). While these barriers are similar to those felt by adults, the developmental changes that adolescents are working through exacerbate their frustration due to these challenges. Caregivers must also be taken into account due to consent requirements (4). Similar to children, the needs of adolescents studying away from home should be considered.

Considering the perspectives and needs of adolescents as DSD models are developed is important. Peer support and group-based interventions are greatly valued by adolescents; as such, models that facilitate peer support will be important to consider. Other aspects of interventions noted to engage adolescents in care include improved access to clinics and youth-friendly, multidisciplinary HIV clinics geared towards adolescents (14). Participation in support groups was also associated with improved adherence (17). Given the value of these interventions, there is a need to further examine how they can be brought together effectively and taken to scale by national health systems.

Several other considerations must be made for adolescents when addressing how to define stability and how best to address their needs. Adolescence spans a period from 12 to 19 years of age; their rapid development and emerging independence require consideration of how to most effectively empower them to self-manage their disease. Models may therefore have to allow a more family-centred approach with a caregiver, which can be transitioned to fostering independent HIV management. The package may also have to integrate sexual and reproductive health services, services for pregnant adolescents and support for transition from adolescent to adult ART services. Considerations for differentiation between horizontally infected and vertically infected adolescents may also be necessary as those vertically infected may have other health and developmental problems that require closer clinical oversight (18); it is unclear if they will be well served in a DSD model where care is provided by non-specialist clinicians. Frequent psychosocial screening and assessment may be important to identify risk factors for sub-optimal outcomes for adolescents.

From a service delivery perspective, adolescents are often grouped with children or adults despite the fact that they face unique clinical and psychosocial issues. As a result, there is limited adolescent-specific evidence from implementation experience, even for routine service delivery, and the basic standard of care for this population is still evolving. All is made more challenging as there are varying definitions of adolescence across countries, as well as a lack of disaggregated data in the adolescent age ranges, making it arduous both to distinguish adolescent-specific interventions in service delivery models and to track outcomes in adolescents as they transition from childhood through adolescence into adulthood. There is also lack of understanding of what “adolescent-friendly services” entail, and whether these types of services are feasible in resource-limited settings.

Pregnant and breastfeeding woman (PBFW)

Pregnant women are generally recommended to have a number of fairly intensive interactions with the health system through the period of pregnancy; for pregnant women living with HIV, these interactions are even more complex. It is important to have DSD models that recognize and accommodate these clinical needs from the start of their pregnancy to the post-natal period. In most settings, a woman attending ante-natal care will have at least four ante-natal and two post-partum visits, in addition to the visits for immunization of their child up to 18 months of age.

A distinction should also be made between women who know their status and are already on stable ART and those who are diagnosed at the antenatal clinic (ANC) as they may have different

support needs. In addition, women who are diagnosed late in ANC or early in the post-partum period are at a higher risk of vertical transmission and therefore need more intensive clinical monitoring, which may make them unsuitable to be managed as stable clients in a DSD model.

In many countries with a high HIV burden, it is now the standard of care for PBFW living with HIV to receive their pregnancy-related and HIV care in an integrated manner. Integrating ART delivery within ANCs and maternal and child health (MCH) services has also been recommended; the authors of a recent systematic review found that this approach results in better continuity of HIV services (19). For women accessing services in this integrated fashion, DSD models would have to consider transition from MCH services to adult HIV services as it has been shown that women and their infants are most likely to be lost to follow up in this transition (4). Alternately, for women with HIV who are already stable on ART when they become pregnant, changing their ART delivery from HIV to MCH services while pregnant or breastfeeding may not be an optimal strategy. Additionally, psychosocial support and counselling are important services to provide for women living with HIV during their pregnancy, as are guidance for infant feeding and post-partum care.

Scope of the review

While the principles of differentiated care apply across the HIV cascade, from testing through to treatment, there is significant momentum, policy guidance and evidence for scaled-up implementation of differentiated delivery of HIV care and ART services.

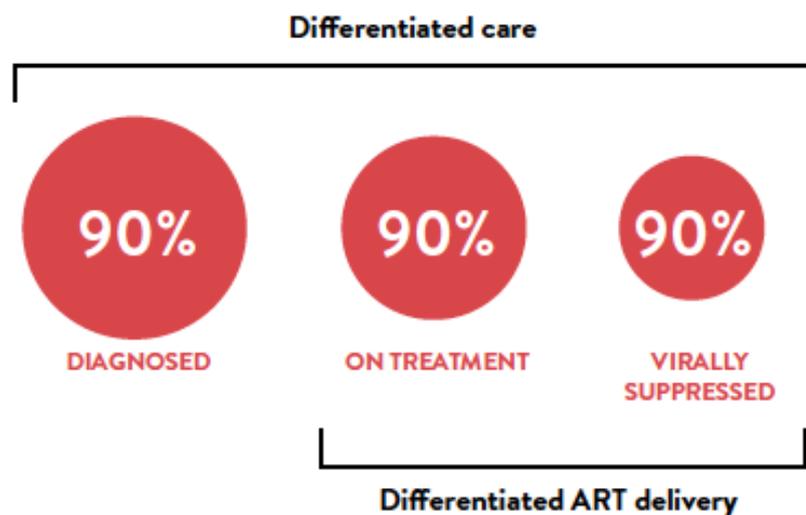


Figure 2: Differentiated care is applicable across the HIV care continuum (1)

In the “Consolidated guidelines on the use of antiretroviral drugs for treating and preventing HIV infection: Recommendations for a public health approach”, the diversity of care needs for people living with HIV was acknowledged. Clients were divided into four broad categories: people presenting well, people with advanced disease, stable individuals and unstable individuals. The first two groups relate to the clinical status at presentation or before ART initiation; differentiated service delivery for these groups will have to focus on models to support appropriate ART initiation and initial management on ART. The second two groups describe people already on ART (i.e., ART maintenance phase).

People living with HIV	Appropriate package of care
People presenting well	Adherence and retention support
People with advanced disease	Clinical package to reduce morbidity and mortality
Stable individuals	Reduced frequency of clinic visit, task-shifted care and community ART delivery models
Unstable individuals	Adherence support, viral load testing, switch to second- or third-line ART if indicated, monitoring for HIV drug resistance

Table 1: Diversity of care needs for people living with HIV; adapted from the 2016 WHO Consolidated Guidelines on the use of antiretroviral drugs for treating and preventing HIV infection

As ART cohorts have matured, a growing number of people in treatment programmes are stable and virally suppressed and do not require as frequent clinical and laboratory monitoring or intensive facility-based care as more clinically unstable clients. WHO now recommends the approach of differentiated care as evidence from pilot programmes has demonstrated that simplifying the models of service delivery for stable clients improves retention in care and viral suppression (4). Further, by reducing the volume of stable clients, facility resources, including staff time and clinic space, can be better allocated to clients most in need. The focus therefore in this review of families is on the definitions and models for stable clients.

The service delivery package for the client group described as “unstable individuals” has to some extent already been established, reflecting the need for an increased intensity of clinical support and services. In this paper, particular attention will be given to describing how to define “stable individuals” in the specific populations and identifying ways to ensure appropriate and robust referral mechanisms into and out of stable client care. Further, models of service delivery related to outreach, testing and linkage and community support will be identified for their potential to be expanded to include the delivery of ART.

This review moves beyond already established recommendations for ART delivery that include task shifting, integration of ART care within MCH programmes and decentralization of service delivery. There is already evidence on the benefits of these approaches and, in many instances; they are already the standard of care. WHO recommends that lay providers distribute ART (including for children) with sufficient training between clinic visits (4) as it has been shown that nurse-driven care systems can deliver ART effectively to children and result in immunological and clinical improvement (20,21). Integration of ART delivery into MCH services is also a WHO recommendation (22), and is widely practiced. In almost all settings where “Treat All” has become the standard of care for pregnant and breastfeeding women, it is nurses in MCH clinics who have been responsible for initiating and maintaining women on ART.

Decentralization of services is also already recommended by WHO (4). Down-referral of children stable on ART to primary health care clinics has been shown to be protective against loss to follow up (23). As such, this review takes these recommendations into account as key inputs for a differentiated care model, and moves beyond them to explore models that lessen the frequency of

ART refills and clinical consultations for primarily stable clients, de-link ART refill collection visits from clinical review visits, fast track ART collection processes, provide ART refills to families or groups rather than individuals, and move ART refill collection out of health care facilities into communities.

Part 3. Methods

The aim of this review was to consolidate the experience and evidence regarding DSD models for families utilizing both published and grey literature. The PubMed database was searched for information on adolescents, children and PBFW that mentioned the following key terms: stable patients, extended ART supply/refill periods (2/3 monthly) or appointment spacing, task shifting ART refills (beyond nurse-managed care within clinician-led facility-based care), fast tracked/streamlined, ART services outside of usual clinic hours, ART refill/drug collection outside of the facility/in community (including searching for mobile ART refill services), and providing ART refills/ART services to groups/clubs. For PBFW, papers from three systematic reviews that looked at evidence on efforts to reduce mortality among this specific population were also reviewed. Thereafter, all International AIDS Society (AIDS and IAS) Conference and 2015/2016 Conference on Retroviruses and Opportunistic Infections (CROI) abstracts relating to the aforementioned topics were identified. Bibliographies of relevant papers were also reviewed to locate additional information. Additional data was collected through outreach to contacts, key stakeholders and experts in the HIV/AIDS sector who are knowledgeable of DSD models for families.

Part 4. Rapid review of differentiated models

In total, 21 models were included in this review, describing the experience from at least 15 countries. Although the models captured are primarily in areas with high prevalence of HIV and in Africa, it is expected that some lessons could also be drawn for settings with low HIV prevalence. The models were disaggregated by the specific population for the purpose of description and because many of the models only addressed one of the specific populations within families, although some did follow a family approach. The models that cater for both the caregiver and the child or adolescent include the Adolescent/Young Adult Integrated Community ART Group (CAG), the Family Adherence Club, and the Children Integrated CAG. The model called Post-partum Women Integration into Adherence Clubs utilizes a partial family approach, where a woman could be in the same club as an adolescent or adult member of her family but not her children. The rest of the models either cater to only one specific population or it is not clear from the available documentation whether the model caters to other members of a family.

4.1 Models for children

Four DSD models were found for children: a health care worker-managed group called a Family Adherence Club, a client-led group called the Children Integrated CAG, and two facility-based individual models: one called Streamlined Care for Children and the other a model implemented through outreach ART services called Down-referral and Appointment Spacing for Children. The first two of these have a family-based approach and also provide ART care and peer support to the caregiver. Caregivers attending the Family Adherence Club also receive support for child disclosure. All models are for stable clients on ART except the Streamlined Care for Children, which is

specifically for children who started treatment while well and with CD4 > 500. ART refills vary from one month to every 3-4 months. Clinical consultations in facility-based individual models (Streamlined Care for Children, and Down-referral and Appointment Spacing for Children) occur with every ART refill collection. In health care worker-managed group models, clinical reviews do not take place at every ART refill collection. In Family Adherence Clubs, dosage checks are done at every ART refill visit, but clinical reviews take place once a year for the child/children, caregiver and any other family member in the club. Meanwhile, in Children Integrated CAGs, caregivers (and any other adult family members) are only required to attend a clinical review once every six months, but the caregiver is required to accompany their child to clinical reviews, including a dosage check every second month at the facility. Referrals are conducted through self-referral, other group members or a nurse. When a child becomes clinically unstable, the child and their caregiver are removed from the Family Adherence Club; in the CAG model, only the child is removed.

There is evidence of increased retention and viral suppression in these models (11,20,24), although Children Integrated CAGs did not differentiate between adolescent and children outcomes. No significant differences in retention or clinical outcomes were found in children receiving care through the decentralized sites in the Down-referral and Appointment Spacing for Children model (25). This evidence aligns with findings from other studies that suggest children can receive effective ART management at decentralized primary health care facilities (18,26-28).

Differentiated ART delivery models for stable children

Model name	Streamlined Care for Children		HIV management and ART delivery is streamlined at study facilities for children with scheduled appointments, appointment reminders, nurse-driven visits focusing on symptom-based ART toxicity screening, and referring complex cases to a doctor. Three-month ART refills were provided with viral loads taken at ART initiation and then 2 yearly.						
Initial implementer/ location details	Adopted/ scaled out by DOH	Type of ART delivery model	Population differentiation components		Model differentiation components	Building blocks		Evidence (published/ grey)	Resources
							ART refill and clinical review		
SEARCH/ Infectious Disease Research Collaboration Uganda, Kenya	No	Facility-based individual	<i>Sub-pop</i>	Children <i>2-14 years</i>	↓ ART refill/clinical frequency Task shifting (Unknown whether aligned with caregiver ART refill)	When	0 wks, 4, wks, 12 wks then 3 monthly*	↑ adherence and VL suppression (20)	Mwangwa et al (2016) AIDS poster presentation
			<i>Clinical</i>	Started ART well <i>CD4 >500</i>		Where	PHC		
			<i>Context</i>	Urban/high burden/genera-lized epidemic		Who	LHCW Nurse		
						What	Adherence counselling/support Labs (VL: 0 wks, 24 wks, 48 wks) Clinical review ART rescripting ART refill Referral if necessary		
						Referral mechanism	Children seen by nurse at each visit and referred to doctor if complex clinical support required		
						Which service	ART service		

* Throughout this review, 2 monthly, 3 monthly, 4 monthly and 6 monthly should be read to mean every second, third, fourth or sixth month

Model name	Down-referral and Appointment Spacing for Children		Children stable on ART were referred from referral district hospitals to closer clinics (not providing ART services). Children were seen 3 monthly for clinical review by an outreach team from the central hospital and provided with 3-month ART refill						
	Adopted/ scaled out by DOH	Type of ART delivery model	Population differentiation components		Model differentiation components	Building blocks		Evidence (published/grey)	Resources
						ART refill and clinical review			
Zambia MOH		Facility-based individual	<i>Sub-pop</i>	Children <i>0-16 years (Average 4.9 yrs)</i>	↓ ART refill/clinical frequency (Unknown whether aligned with caregiver ART refill)	When	3 monthly	No significant differences in retention or clinical outcomes as children who remained at centralized site (25)	Van Dijk et al (2014) PLoS One
			<i>Clinical</i>	Stable on ART <i>>3 months on ART, demonstrated good adherence, no OIs and want care closer to home</i>		Where	PHC		
			<i>Context</i>	Rural/high burden/generalized epidemic		Who	Outreach team from district hospital		
			What	Adherence counselling/support ART refill Labs Clinical review ART rescripting Referral if necessary					
			Referral mechanism	Unclear if referred back to main site if become unstable					
			Which service	Outreach ART service					

Model name	Family Adherence Club		Family clubs are comprised of 15 children stable on ART and their caregivers. Clubs are led by a lay health care worker and meet five times per year. Family clubs are grouped by age bands of children (4-7 years, 7-10 years, 10-15 years) and disclosure status. In this model, both the children and their caregivers (if HIV positive and stable on ART) receive their pre-packed ART in the group (caregiver's ART pre-packed before club visit and children's ART packed during group support session). Caregivers or other treatment supporters can collect ART refill without the child at every second club visit. The annual viral loads and clinician reviews are aligned with group ART refill collection. The lay health care worker provides support to caregivers for phased child disclosure and peer support.							
Initial implementer/ location details	Adopted/ scaled out by DOH	Type of ART delivery model	Population differentiation components		Model differentiation components	Building blocks			Evidence (published/grey)	Resources
MSF pilot, Khayelitsha, South Africa	In Western Cape (WC) policy but roll out slow Swaziland endorsed in policy (monthly session and 3-monthly ART refill for stable) <i>Extent of roll out unknown</i>	HCW-managed group	<i>Sub-pop</i>	Children <i>5-12 years</i>	Caters for sub-pop & their family/caregivers – Family approach ↓ ART refill/clinical frequency Task shifting ↑ peer support ↑ child disclosure	<i>When</i>	4 x 2 monthly 1 x 4 monthly (5 times per year)	Annual	↑ adherence and VL suppression for children in model (11) ↑ child disclosure (11) (Analysis for publication underway – expected early 2017)	Wilkinson et al (2015) IAS poster presentation MSF family club report and toolkit Swaziland Community-centred models for ART delivery guidelines
			<i>Clinical</i>	Stable on ART <i>12 months on ART, 2 consecutive UD VL and no clinical condition requiring more regular follow up</i>		<i>Where</i>	PHC			
			<i>Context</i>	Urban/high burden/genera-lized epidemic		<i>Who</i>	LHCW	Nurse		
			<i>What</i>	Weight/symptom screen Dosage check (by nurse during support group session) ART refill Adherence/ progressive disclosure support Referral if necessary Labs (by nurse after group)		ART rescripting Clinical HIV review				
			<i>Referral mechanism</i>	Club nurse available to see any unwell client immediately after group session <i>Self-referred/LHCW refers/club nurse sees weights</i> Child & caregiver removed if child becomes unstable and referred to intensified counselling/clinical support intervention (paediatric risk of treatment failure intervention)						
			<i>Which service</i>	ART service						

Model name	Children Integrated CAG		Child clients stable on ART may join their caregivers' Community ART Groups (groups of 6). They meet at a community venue the day before or on the day of the groups' scheduled facility visit. Each caregiver member reports on adherence, and undergoes a pill count and brief symptom screen for him/herself and child member, which is completed on a group monitoring form. The group uses the opportunity to provide each other with peer support. Each adult member (including caregiver) takes a rotating turn to attend the health care facility for monitoring tests and clinical review while collecting ART refills for all members of the group. All members' ART cards/clinical folders are pulled at the facility and the attending group member reports on the health and adherence of each member from the group monitoring form to the clinician who completes the client ART card/clinical folder. The collecting member thereafter travels back to the community venue, meets the group at the same venue, and distributes collected ART refills, including those for children. Child CAG members attend the facility every second month with their caregiver for clinical review and dose checking. Any child group member who is unwell can seek clinical support at any other time.							
Initial implementer /location details	Adopted/ scaled out by DOH	Type of ART delivery model	Population differentiation components		Model differentiation components	Building blocks			Evidence (published/ grey)	Resources
							ART refill	Clinical		
MSF pilot, Tete, Mozambique <i>No longer in operation</i>	No	Client-led group	<i>Sub-pop</i>	Children <i>5-12 years</i>	Sub-pop receives care with family/ caregivers – Family approach ↓ ART refill at facility/clinical frequency Task shifting ↑ caregiver peer support	When	Monthly	2 monthly	↑ Retention but not disaggregated between Children Integrated and Adolescent CAG models (24)	Decroo et al (2012) AIDS poster Not specifically described in MSF CAG toolkit
			<i>Clinical</i>	Stable on ART		Where	Community	PHC		
			<i>Context</i>	Rural/high burden/genera-lized epidemic		Who	Adult client	Nurse		
						What	ART refill Group adherence	Dose review Lab tests ART scripting Clinical monitoring		
					Referral mechanism	Nurse available at facility (not CAG community venue) <i>Caregiver referred/group referral to attend facility</i> Child client removed from CAG if clinically unstable requiring intensified clinical care				
					Which service	ART service				

4.2 Models for adolescents

Six DSD models targeting adolescents were identified, including Youth/Teen Clubs, CAGs and Saturday Adolescent-focused Services. All are implemented in high-prevalence, generalized epidemic areas, but cover urban, peri-urban and rural settings. Two of the models are health care worker-managed groups, two are variations of the same client-managed group model, and two are a combination of health care worker-managed and facility-based individual (fast-track) models. The Saturday adolescent-focused services offer weekend clinic hours to accommodate the schedules of school- or college-going students. Almost all are managed at primary health care facilities except for the Saturday adolescent-focused services, which also take place at a district hospital or at a tertiary referral centre.

The models are primarily for stable clients, although one includes clients when still ART ineligible through ART initiation and another includes those that are not stable on ART but excludes pregnant adolescents. Another model specifically includes pregnant adolescents on ART. All models include psychosocial and adherence support, and emphasize peer support. When an adolescent becomes clinically unstable, they are referred back to clinician-led, facility-based care. However, models deal differently with a high viral load; most refer to facility-based services while Youth Adherence Clubs and Swaziland Teen Clubs maintain the adolescent in the group while providing intensified adherence support and more frequent clinical consultations. ART refills and clinical consultations for unstable clients are commonly conducted on a monthly basis. Stable clients receive ART refills every two or three months, and clinical reviews are completed either at each ART refill visit (Saturday Teen Clubs, Saturday Teen Clinic) or less frequently, most commonly six or 12 monthly (Youth Adherence Club, CAG youth variations, Swaziland Teen Clubs). The Youth Adherence Club also reduces the frequency of ART refills and clinical consultations after the first six months of participation. Referrals are conducted through self-referral, other group members, the lay health worker, or a nurse or doctor where clinics run outside of normal operating hours.

Some differentiated care models for adolescents have reported outcomes. Increased retention was found in the Youth Adherence Club (29,30), which differed from a study that found no difference in the risk of loss to follow up for adolescents included in predominantly adult Community Adherence Clubs (CACs) compared with those in the standard of care (31). Increased retention was also found in the Saturday Teen Clubs (12), Saturday Teen Clinics (32) and Adolescent Only CAG (24), although the outcomes reported for the latter were not disaggregated between children and adolescents (24). Increased viral suppression was also reported in adolescents attending Saturday Teen Clinics in comparison with those attending weekday paediatric ART services (32). Limited evidence exists on the effects of participation in DSD models for unstable clients, although one model that includes pregnant adolescents found that retention in care increased (12). No evidence to date exists on the effectiveness of the Adolescent/Young Adult Integrated CAG or the Swaziland Teen Clubs.

Many models exist to support adolescents living with HIV, which are currently not utilized for ART delivery. Two that are scaled beyond a pilot site are the Community Adolescent Treatment Supporters (CATS) model in Zimbabwe and the Teen Clubs implemented by Baylor in multiple countries. The CATS model supports adolescent adherence and facilitates the linkage between the community and health facilities for adolescents. Stable adolescents receive a monthly home visit

while unstable adolescents receive enhanced care through weekly or two-weekly home visits. Both receive sms reminders, pill boxes and attend a monthly support group. Their stable ART clients mostly receive 3-monthly ART refills from their health facilities. This model has been shown to increase self-reported adherence to ART, and two RCTs are underway to further generate evidence for this model (33,34). The Teen Clubs are implemented at specialized paediatric clinics where adolescents receive multi-month prescriptions and attend club meetings, where they receive support for disclosure, adherence and other psychosocial needs. There are similar models to Baylor's Teen Club implemented throughout the region; they are composed of a support group for adolescents that provides ancillary psychosocial care (including peer support), while clinical consultation and provision of medication is managed by health facilities. Both have potential to be adapted into a health care worker-managed or out-of-facility individual (community ART refill collection) DSD models.

Differentiated ART delivery models for stable adolescents

Model name	Youth ART Adherence Club	Youth clubs are closed groups of approximately 20 members, including youth who are ART ineligible, newly initiated and stable on ART. Separate groups are formed for youth still attending school and for older youth (and separate groups for vertically and horizontally infected). Youth clubs are led by a lay health care worker and have a nurse allocated to support clinical duties (not present in group session). Groups meet monthly for the first 6 months and bi-monthly thereafter at the clinic. ART refills, HIV clinical management and family planning are integrated into the youth club model. Youth stable on ART receive their ART refill in the group while newly initiated youth are given their ART refill by the club nurse during their clinical consultation, which takes place immediately after the group meeting. There is a structured and interactive activity-based group session at each visit; this provides the opportunity for development of a peer dynamic and support system.											
Initial implementer/ location details	Adopted/scaled out by DOH	Type of ART delivery model	Population differentiation components		Model differentiation components	Building blocks			Evidence (published/ grey)	Resources			
							ART refill	Clinical					
MSF pilot, Khayelitsha, South Africa	In Western Cape and South Africa, policy and roll out beyond pilot sites to 10 large Western Cape DOH ART sites	HCW-managed group	<i>Sub-pop</i>	Adolescents & young adults <i>12-25 years</i>	Caters for sub-pop only (separate groups adolescent & young adults) ↓ ART refill/clinical frequency Task shifting ↑ peer support	<i>When</i>	Monthly x 6 Thereafter: 2 monthly	New on ART: 6 times (m1-m5: monthly + m12) Stable on ART 1 st year: twice Thereafter: annually	↑ Retention (29,30) (Analysis for publication underway – expected early 2017)	Wilkinson et al (2016) AIDS poster MSF youth report and toolkit http://www.differentiatedcare.org/Models/YouthClubs/Details			
			<i>Clinical</i>	Stable ineligible pre-ART Well, newly initiated Stable on ART <i>12 months on ART & 2 UD VLs</i>		<i>Where</i>	Youth-focused PHC/general PHC				<i>Who</i>	LHCW (trained adolescent friendly) Nurse (only for any labs/family planning)	Club nurse allocated to group
			<i>Context</i>	Urban/high burden/generalized epidemic		<i>What</i>	Weight/symptom screen ART refill Structured youth-focused adherence support Referral if unwell Labs/FP (by nurse after group)	ART refill (for new on ART) ART rescripting Clinical review					
			<i>Referral mechanism</i>	Club nurse available to see any unwell client/red flag result client immediately after group session <i>Self-referred/LHCW refers/club nurse checks in on group to identify any necessary referrals</i> Youth clients not easily removed from the group but provided with more frequent clinical care									
			<i>Which service</i>	ART service									

Model name	Adolescent/ Young Adult Integrated CAG	Adolescent and young adults older than 14 years stable on ART may join a Community ART Adherence Group (CAG). These groups of 6 clients meet at a group member's home or venue close to all the members' homes the day before or on the day of the groups' scheduled facility visit. Each member reports on adherence and undergoes a pill count and brief symptom screen, which is completed on a group monitoring form. The group members use the opportunity to provide each other with peer support. Each member takes a rotating turn to attend the health care facility for monitoring tests and clinical review while collecting ART refills for all members of the group. All members' ART cards/clinical folders are drawn at the facility and the attending group member reports on the health and adherence of each member from the group monitoring form to the clinician who completes the client ART card/clinical folder. The collecting member thereafter travels back to the community venue, meets the group at the same venue and distributes collected ART refills. Any group member who is unwell or reports symptoms can attend the facility with the group representative or seek clinical support at any other time. <i>Younger children may attend a CAG as a passive member but need to attend facility for ART refill and clinical review.</i>								
Initial implementer/ location details	Adopted/scaled out by DOH	Type of ART delivery model	Population differentiation components		Model differentiation components	Building blocks			Evidence (published/grey)	Resources
						ART refill	Clinical			
MSF pilot, Tete	Yes, MOH has endorsed CAG model as national policy and rolled out throughout Mozambique. <i>Adolescents/ young adults >14 years are allowed to join these standard adult CAGS</i>	Client-led group	<i>Sub-pop</i>	Adolescents >14 years (not pregnant)	Sub-pop can receive care with family/ caregivers – Family approach ↓ ART refill at facility/clinical frequency Task shifting ↑ peer support	When	Monthly	6 monthly	None	Not specifically described in MSF CAG toolkit
			<i>Clinical</i>	Stable on ART 6m on 1 st line ART, disclosure completed, CD4 >200 and clinically stable		Where	Member's home/ community venue close to members' homes	PHC		
			<i>Context</i>	Urban/peri-urban/ rural High burden/ generalized epidemic		Who	Client/peer	Nurse		
						What	ART refill Group adherence	Lab tests ART scripting Clinical monitoring		
						Referral mechanism	Nurse available at facility (not CAG community venue) <i>Self-referred/group referral to attend facility</i> Youth client removed from CAG if clinically unstable requiring intensified clinical care			
				Which service	ART service					

Model name	Adolescent Only CAG	Youth clients stable on ART are supported to form groups of 6. They meet at a community venue the day before or on the day of the groups' scheduled facility visit. Each member reports on adherence and undergoes a pill count and brief symptom screen, which is completed on a group monitoring form. The group members use the opportunity to provide each other with peer support. Each member takes a rotating turn to attend the health care facility for monitoring tests and clinical review while collecting ART refills for all members of the group. All members' ART cards/clinical folders are pulled at the facility and the attending group member reports on the health and adherence of each member from the group monitoring form to the clinician who completes the client ART card/clinical folder. The collecting member thereafter travels back to the community venue, meets the group at the same venue and distributes collected ART refills. Any group member who is unwell or reports symptoms can attend the facility with the group representative or seek clinical support at any other time. All youth CAGS meet at the facility on scheduled group activities on Saturdays to strengthen their peer network.								
Initial implementer/ location details	Adopted/scaled out by DOH	Type of ART delivery model	Population differentiation components		Model differentiation components	Building blocks			Evidence (published/grey)	Resources
							ART refill	Clinical		
MSF pilot, Tete at 1 facility <i>No longer in operation</i>	No	Client-led group	<i>Sub-pop</i>	Adolescents <i>12-18 yrs</i>	Caters for sub-pop only	When	Monthly	6 monthly	↑ Retention but not disaggregated between adolescent and child CAG models (24)	Decroo et al (2012) AIDS poster Not specifically described in MSF CAG toolkit
			<i>Clinical</i>	Stable on ART <i>Clinically stable and fully disclosed</i>	↓ ART refill at facility/clinical frequency	Where	Community	PHC		
			<i>Context</i>	Urban/high burden/generalized epidemic	Task shifting ↑ peer support	Who	LHCW	Nurse		
						What	ART refill Group adherence Youth activities <i>(on Saturday at facility not aligned with ART refill date)</i>	Lab tests ART scripting Clinical monitoring		
						Referral mechanism	Nurse available at facility (not CAG community venue) <i>Self-referred/LHCW referral to attend facility</i> Youth client removed from CAG if clinically unstable requiring intensified clinical care			
					Which service	ART service				

Model name	Saturday Teen Clubs		Adolescents who understand their status are enrolled in Saturday teen clinics known as ‘Teen Clubs’. There are separate clubs for younger and older youth (30-70 youth in a club depending on size of cohort at site). These are run on a Saturday outside of normal clinic hours and are only for adolescents. The club is facilitated by a club mentor (trained and mentored in the Baylor Teen Club curriculum). The adolescents attend their club for adherence and psychosocial support, as well as for activities. During the club activities, a nurse sees each adolescent individually for their ART refill and clinical review as per a routine clinic visit. Stable adolescents only need to attend every second or third month and receive 2-3 month ART refills (varies across implementation sites).						
Initial implementer/location details	Adopted/scaled out by DOH	Type of ART delivery model	Population differentiation components		Model differentiation components	Building blocks		Evidence (published/grey)	Resources
Dignitas International South East Zone, Malawi <i>(adapted from Baylor Teen Club model below)</i>	Yes, throughout Malawi with 2 year implementation support from partners including Baylor and Dignitas 9313 adolescents in 135 clubs in 26/28 districts	HCW-managed group/facility-based individual	<i>Sub-pop</i>	Adolescents & Young adults <i>9-23 years (Average 12.4 yrs)</i>	Caters for sub-pop only	When	Monthly (new/unstable) 2 -3 monthly (stable)	↑ retention (12)	Agarwal et al (2013) IAS oral abstract
			<i>Clinical</i>	Adolescents on ART Including new mothers <i>On ART and disclosed status Includes pregnant adolescents</i>	Task shifting	Where	Tertiary ART referral centres/PHC		
			<i>Context</i>	Urban/high burden/genera-lized epidemic	↑ peer support	Who	Clinician Trained lay HCW		
			What	Weight, TB, nutrition and STIs screening Labs/FP ART refill Clinical review Structured adolescent-focused adherence and psychosocial support					
			Referral mechanism	Clinician sees all adolescents at each visit					
			Which service	ART service					
			http://dignitasinternational.org/hiv/teen-club/						

Model name	Swaziland Teen Clubs		Twenty adolescent clients (groups split for 10-15 years and 15-19 years) meet for approximately an hour every month. The groups are facilitated by a nurse and a lay health care worker (LHCW). The nurse conducts a quick clinical assessment and refers if necessary. The LHCW conducts TB screening and facilitates the group discussion. At every third meeting, stable patients are provided with 3 months of pre-packed ART by the LHCW overseen by the nurse. Unstable group members are seen individually for clinical review every month while a clinician only sees stable group members twice a year after the group session. They also have access to clinicians through the model referral mechanisms if they become unwell. Stable group members are allowed to send a friend or family member to collect their ART drug supply in the group every second visit but not for a clinical review visit. Group attendance is recorded as a client visit in the paper-based registers, which are then captured in the facility's records.							
Initial implementer /location details	Adopted/ scaled out by DOH	Type of ART delivery model	Population differentiation components		Model differentiation components	Building blocks			Evidence (published/ grey)	Resources
							ART refill	Clinical		
Baylor pilot, Swaziland (without ART refill)	MOH policy, Swaziland (extent of roll out unknown)	HCW-managed group	<i>Sub-pop</i>	Adolescents 10-19 years	Caters for sub-pop only ↓ ART refill/clinical frequency Task shifting ↑ peer support	When	Monthly meeting ART refill 3 monthly for stable only	Monthly (unstable) 6 monthly (stable)	None	Swaziland Community-centred models for ART delivery guidelines and SOP http://www.differentiatecure.org/Po rtals/0/ada m/Content/3hJ_aSMJ90 yzsJNMsSsYW CQ/File/Swa ziland%20SO Ps%202016. pdf
			<i>Clinical</i>	Unstable on ART Stable on ART Fully disclosed, 6m on ART at same facility, UD VL and no significant co-morbidities or pregnancy		Where	PHC			
			<i>Context</i>	Urban/high burden/ generalized epidemic		Who	Clinician & LHCW (trained adolescent friendly)	Clinician (nurse/doctor)		
						What	Quick clinical assessment ART/ Isoniazid preventive therapy (IPT)/ Co-trimoxazole preventive therapy (CPT) refill (for stable only) TB screening Group counselling & adherence support Referral if unwell	Labs Clinical review TB screening Adherence support ART rescripting Cervical screening Family planning Non-communicable disease (NCD) screening		
					Referral mechanism	Nurse partly facilitates group and conducts quick clinical assessment to identify unwell clients <i>Self-referred/LHCW or nurse referred</i> Adolescents removed from Teen Club if regarded to be clinically unstable and require intensified clinical care				

						Which service	ART service		
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Model name	Saturday Teen Clinic		Adolescents receiving care at once-weekly paediatric day at district hospital ART service were given option to join to monthly Saturday adolescent-focused clinic when they had been on ART for 6 months and were stable (due to rapid weight gain after ART initiation). They attend 2 monthly to receive pre-packed ART refills and clinical management, and take part in youth activities that run throughout morning and lunch (09h30-13h30). A doctor and lay health care workers run the clinic. Two groups are run on alternate-month Saturdays, but slots are full with no further enrolment after November 2012.						
Initial implementer /location details	Adopted/ scaled out by DOH	Type of ART delivery model	Population differentiation components		Model differentiation components	Building blocks		Evidence (published/grey)	Resources
							ART refill and clinical review		
Don McKenzie Hospital, Ethembeni Clinic, Botha's Hill, KwaZulu-Natal, South Africa	No	HCW-managed group/facility-based individual	<i>Sub-pop</i>	Adolescents & Young adults <i>13-24 years</i>	Caters for sub-pop only ↓ ART refill/clinical frequency	When	Saturday morning 2 monthly	↑ Retention and VL suppression when compared with paediatric weekday ART clinic service with same staff (32)	Zanoni et al (2016) Paeds workshop AIDS oral abstract (JIAS paper in press – 2017)
			<i>Clinical</i>	Stable <i>6 months on ART and fully disclosed</i>		Where	ART clinic at district hospital		
			<i>Context</i>	Peri-urban/high burden/genera-lized epidemic	Some task shifting ↑ peer support	Who	LHCW Doctor		
						What	ART refill Group support and activities Individual adherence counselling Labs (VL once a year) Clinical review Lunch		
						Referral mechanism	Doctor sees all adolescents at each visit Adolescents are removed from Saturday clinic if requiring more regular clinical follow up or investigations and return to weekday service		
			Which service	ART service at district hospital					

Adolescent non-ART delivery adherence support models but could easily be added/aligned service to existing model

Model name	Community Adolescent Treatment Supporters (CATS)		Stable adolescents attend their clinics and receive 3-monthly ART refills as standard of care (SOC). In addition, they receive support from CATS. If stable this includes a monthly home visit. If unstable, enhanced support includes weekly or two-weekly home visits. All receive pill boxes, sms clinic appointment and adherence reminders and attend a monthly support group. All home visits include an assessment to identify any red flags requiring referral for follow-up.					
Initial implementer /location details	Adopted/ scaled out by DOH	Type of ART delivery model	Population differentiation components		Model differentiation components	Building blocks	Evidence (published/grey)	Resources
Africaid pilot, Harare, Zimbabwe	Adopted and scaled out by MOH, Zimbabwe 700 CATS in 24 districts	Could be HCW-managed group or out-of-facility individual	<i>Sub-pop</i>	Adolescents & Young adults <i>10-19 years</i>	Caters for sub-pop only Task shifting ↑ peer support		↑ self-reported adherence (33,34) (2 new step-wise implementation randomized trials underway)	Willis et al (2015) ICASA oral presentation Willis et al (2016) AIDS oral presentation
			<i>Clinical</i>	Pre-ART/on ART <i>Stable: CD4>500 or suppressed VL, self-report adherent, psych well, safe</i> <i>Unstable: CD4<500 or detectable VL, non-adherent, missed appt, psych distress, neglect</i>				
			<i>Context</i>	Peri-Urban/high burden/generalized epidemic				

Model name	Teen Clubs		Adolescents attend Baylor specialized centralized paediatric ART facilities, receive multi-month scripts (see below) and attend Teen Clubs (usually on the same day), which provide disclosure, adherence and other psychosocial support.					
Initial implementer/location details	Adopted/scaled out by DOH	Type of ART delivery model	Population differentiation components		Model differentiation components	Building blocks	Evidence (published/grey)	Resources
Baylor, multi-country Botswana, Uganda, Malawi, Swaziland, Tanzania and Lesotho	Yes adapted for DoH implementation in Malawi and Swaziland (see above)	Could be HCW-managed group	<i>Sub-pop</i>	Adolescents & Young adults <i>(Age bands unknown)</i>	Caters for sub-pop only Task shifting ↑ peer support			Pettitt et al (2013) African Journal of SRH (35) https://botswanateenclub.wordpress.com/ https://tanzaniateenclub.wordpress.com/about/
			<i>Clinical</i>	Pre-ART/on ART				
			<i>Context</i>	Peri-urban/high burden/generalized epidemic				

4.3 Models for children and adolescents

Four models of differentiated ART delivery for both stable children and adolescents were found. The first two are facility-based individual models provided at specialized paediatric ART facilities. The first, known as Multi-month Prescription (MMP), is a differentiated care appointment spacing approach; the second, known as Standardized Paediatric Expedited Encounters for ART Drugs Initiative (SPEEDI), is an example of the model through which this approach has been implemented. MMP involves 2- or 3-monthly fast-track ART refills, with clinical reviews conducted every four or six months. In SPEEDI, MMP is implemented by clients receiving 2-monthly ART refills and alternate SPEEDI visits with routine clinical reviews, which are conducted every four months. The third model is also a facility-based individual model, called Three-monthly ART Refills for Children and Adolescents, conducted at primary health care clinics. The fourth model is an out-of-facility individual model called Community-based ART (C-BART); it is a mobile outreach service that provides 3- to 6-monthly ART refills at fixed sites in remote rural areas. All models except the MMP/SPEEDI model carry out a clinical consultation at every ART refill visit. MMP/SPEEDI only requires a clinical consultation at every second ART refill.

Some outcomes have been reported for these models. The MMP approach has been implemented in multiple countries and sites, including the SPEEDI example implemented in Tanzania. It has been shown to increase retention, and also contributes to increased viral suppression (36). The C-BART model has shown evidence of good viral suppression; however, this result was not disaggregated between adults and children (37).

One published model for children and adolescents has potential for integration with ART delivery – the Community-Based Adherence Support (CBAS) model, where patient advocates conduct home visits for children/adolescents and their caregivers on a weekly and then monthly basis. Once stable on ART, visits take place on a quarterly basis and group sessions are also conducted at the clinic. This model has been shown to increase adherence and viral suppression in children (38). This is one example of many similar models aimed at supporting adherence that could be utilized for ART delivery.

Differentiated ART delivery models for stable children and adolescents

Model name	Three-monthly ART Refills		Stable children and adolescent clients are entitled to receive 3-monthly ART refills.						
Initial implementer /location details	Adopted/ scaled out by DOH	Type of ART delivery model	Population differentiation components		Model differentiation components	Building blocks		Evidence (published/grey)	Resources
							ART refill and clinical review		
MOH, Kenya	Yes	Facility-based individual	<i>Sub-pop</i>	Children/ adolescents	Unclear whether family ART refills aligned ↓ ART refill/clinical frequency	When	3 monthly	Paediatric average of 5.1 visits per year (compared with adults' 4.9 per year) (39) Approx 30% on ART >2 years >90-day ART refills (disaggregated adult/paeds ART refill data) (39)	PEFAR Kenya expenditure analysis 2015 CHAI Kenya cross-sectional assessment of ART prescription practices 2016 (CDC presentation A Katana June 2016)
			<i>Clinical</i>	Stable on ART		Where	PHC		
			<i>Context</i>	Rural and urban/high burden/generalized epidemic		Who	Nurse		
						What	ART refill Adherence support Clinical review ART rescripting Labs		
					Which service	ART service			

Model name	Multi-month Prescriptions (MMP)		Children, adolescent and young adult clients are managed at a specialized paediatric service. Once they are classified as stable, they have less frequent clinical review visits, which takes place on a 4-6 monthly basis. They receive 2-3 monthly ART refills as part of a fast-track ART refill service between clinical review visits (e.g. SPEEDI model – see below).							
Initial implementer /location details	Adopted/ scaled out by DOH	Type of ART delivery model	Population differentiation components		Model differentiation components	Building blocks		Evidence (published/grey)	Resources	
Baylor, multi-country	No	Facility-based individual	<i>Sub-pop</i>	Children/ adolescents & young adults <i>0-25 years</i>	↓ ART refill/clinical frequency	When	2-3 monthly	4-6 monthly	↑ Retention and VL suppression (36)	Paper in preparation with outcomes
			<i>Clinical</i>	Stable on ART <i>Differs per site</i>		Task shifting	Where	Specialized centralized paed ART facility		
			<i>Context</i>	Urban/high burden/generalized epidemic	Who		Differs per site			
					What		Differs per site			
Which service	Specialized paed ART facility									

Model name	Standardized Paediatric Expedited Encounters for ART Drugs Initiative (SPEEDI)		Children and adolescent clients who are stable on ART are assessed by any clinician at the specialized paediatric facility and enrolled in the SPEEDI programme. These clients are no longer required to see a clinician at each health care visit. During a SPEEDI visit, the client's file is marked at reception to reflect a potential SPEEDI visit. The client/caregiver proceeds to the triage room, where the triage team takes their vital signs and anthropometrics, conducts a pill count and asks if they wish to see a clinician. If not, the client goes directly to the pharmacy to collect a 2-month ART refill. While the client waits at the pharmacy, a clinician quickly reviews the file to ensure the patient is indeed eligible for SPEEDI and writes the appropriate script and lab requisition forms (when needed). Clients alternate fast-track SPEEDI visits with routine clinical review visits, and thus are required to see the clinician 3 times a year. Clients have their viral load taken once a year at the ART refill visit prior to their clinical review allowing for assessment as part of the clinical review.							
Initial implementer /location details	Adopted/ scaled out by DOH	Type of ART delivery model	Population differentiation components		Model differentiation components	Building blocks			Evidence (published/grey)	Resources
							ART refill	Clinical		
Baylor, Mbeya, Tanzania	No	Facility-based individual	<i>Sub-pop</i>	Children/ adolescents & young adults 0-25 years	↓ ART refill/clinical frequency	When	2 monthly	4 monthly	↑ Retention (40)	Bacha et al (2016). Paeds pre-conference workshop AIDS abstract Expected paper in JIAS DC supplement
			<i>Clinical</i>	Stable on ART On ART >6 months, suppressed VL, no medical or social complications, good adherence, presence of a reliable caregiver		Task shifting Caregivers on ART not managed at same site	Where	Specialized paed ART facility (<i>specific days for specific age groups</i>)		
			<i>Context</i>	Urban/high burden/generalized epidemic	Who		Triage team (clinician & LHCW) Pharmacist	Clinician (nurse/doctor)		
					What		ART refill Pill count Vital signs and anthropometrics Dosage check and ART rescripting Labs Referral if unwell	ART rescripting Clinical review ART refill		
Which service	Specialized paed ART service									

Model name	Community-based ART (C-BART)		This model involves mobile outreach from the PHC to fixed points in hard-to-reach rural communities. Outreach is nurse led and provides HIV and ART management for pre-ART and after-ART initiation (which is still done at the PHC with immediate down-referral) irrespective of CD4/viral load or adherence (includes newly initiated and patients with high viral loads). Both adults and children from the 14 rural communities are managed at their C-BART site and receive 3-6 monthly ART refills at a time with total number of fixed point visits by the mobile outreach, 4-5 per annum.						
Initial implementer /location details	Adopted/ scaled out by DOH	Type of ART delivery model	Population differentiation components		Model differentiation components	Building blocks		Evidence (published/grey)	Resources
MOH Namibia/ supported by CDC/EGPAF (pilot 14 rural communities in one district)	No	Out-of-facility individual	<i>Sub-pop</i>	Children, adolescents, young adults & adults <i>>1 year</i>	Sub-pop receives care with family/ caregivers – Family approach ↓ ART refill/clinical frequency Task shifting	When	Three – Six monthly	↑ Viral suppression (84-100%) not disaggregated between adults and children (37)	CDC presentation G Mutandi 2016
			<i>Clinical</i>	on ART <i>(no consideration of stability, only initiated and in rural hard-to-reach community)</i>		Where	Community based outreach point		
			<i>Context</i>	Urban/high burden/generalized epidemic		Who	Outreach team (nurse and counsellor)		
						What	ART refill Group education/adherence support Clinical review ART rescripting Labs Referral if unwell		
						Which service	Outreach PHC ART service		

Non-ART delivery adherence support models for children and adolescents but could easily be added/aligned service to existing model

Model name	Community-based Adherence Support (CBAS)		Patient advocates support for children/adolescents on ART and their caregivers by providing home visits weekly for the first month on ART and then monthly. Once stable on ART (regular clinic attendance and virally suppressed), visits take place quarterly. At these home visits, both adherence and psychosocial issues are addressed. These home visits are often supplemented with group sessions at the clinic.					
Initial implementer /location details	Adopted/ scaled out by DOH	Type of ART delivery model	Population differentiation components		Model differentiation components	Building blocks	Evidence (published/grey)	Resources
Kheth'Impilo supported 57 DOH sites, South Africa	No	Could be out-of-facility	<i>Sub-pop</i>	Children 0-16 years	Caters for sub-pop only		↑ adherence and viral suppression in children (38)	Fatti et al (2014) AIDS Care Some indication also provided to adolescents
			<i>Clinical</i>	on ART	Task shifting			
			<i>Context</i>	Peri-urban/high burden/generalized epidemic	↑ peer support			

4.4 Models for pregnant and breastfeeding women

Only three models were found for PBFW – the Post-natal Club, the Post-partum Women Integration into CACs, and the MCH Integrated Into ART Services model with appointment spacing. The Post-natal Club includes low- and high-risk mother-infant pairs who are provided with integrated management in a health care worker-managed group model at the baby wellness clinic. The second is where post-partum stable women (viral load <1,000), are integrated into CACs for stable adults attending MCH services separately. The third model integrates MCH services into existing ART services and includes appointment spacing for PBFW stable on ART. ART (and cotrimoxazole for the infant) refills occur monthly in the Post-natal Clubs until the infant reaches six months of age, and thereafter every three months until the infant reaches 18 months of age (after which the entire Post-natal Club becomes a CAC for adults). High-risk mother-infant pairs also receive a weekly community-based check up until reclassified as low risk. In the CAC model, women follow the standard Adult Adherence Club model, receiving ART refills five times a year. In the final model, provided the pregnant woman is stable on ART, ART refills are received every three months throughout the pregnancy and post-partum period.

Clinical consultations are conducted annually in the CACs; in the Post-natal Club model, a clinical consultation takes place at every ART refill visit either for the infant or for both the infant and mother. In the MCH Integrated Into ART Services model, pregnant women attend monthly ANC services at their ART clinic, but only attend HIV-related clinical review and ART refill collection every three months. After giving birth, they attend MCH services at their same ART clinic according to the immunization schedule of the infant, which is aligned with their clinical review and ART refill collection visits where appropriate. If a child in the Post-natal Club tests positive, both the mother and child are transferred to paediatric ART services. If a breastfeeding woman misses a CAC visit for more than five days or becomes clinically unstable, she is removed from the club and placed in routine facility-based, clinician-led care.

Evidence from the models for pregnant women and post-partum women is limited. The Post-natal Club is a new pilot (started in 2016) and thus no evidence is currently available. Initial outcomes have been reported for integration of breastfeeding women into CACs, which showed good viral suppression but low retention at 61% (though there is currently no comparable data for retention in women who receive care post-partum at ART clinics) (41). Increased maternal retention and decreases in transmission rates at six weeks after birth have been found in the model of MCH Integrated Into ART Service (42).

The Mentor Mother Model is not currently utilized for ART delivery but has potential for integration. In terms of this model, peer mothers based at facilities and in communities provide both group and individual support sessions to pregnant women and new mothers living with HIV. This model and its variations found throughout the sub-Saharan Africa region provide peer support, and have been shown to increase retention of infants at 6-week testing (36). Integration of ART delivery into this model could produce a health care worker-managed group model and/or an out-of-facility individual model (community-based ART refill collection).

Differentiated ART delivery models for pregnant and breastfeeding (post-partum) women

Model name	Post-natal Club		All HIV-positive mothers are made aware of the existence of the Post-natal Club during their ANC visits. Recruitment for both low-risk mother-infant pairs (LRMIP) and high-risk mother-infant pairs (HRMIP) is done by a mothers2mothers (M2M) facility-based educator at post-natal 6-week visit, and the first club group visit takes place approx. 10 weeks post-partum. Each club includes 6-8 mother-infant pairs (MIPs) (grouped by month of delivery) and is facilitated by a lay health care worker (LHCW/M2M community mentor). Group support focuses on infant care and development and maintaining maternal adherence. The LHCW dispenses ART refills in the group for the period until the next group visit (monthly from 10 weeks to 6 months and 3 monthly thereafter). The MIP will then be seen by an infant follow-up nurse for an integrated consultation. HRMIP receive extra support from M2M with weekly community visits. HIV-positive infants and their mothers are referred out of the Post-natal Club to the standard of care. When the infant reaches 18 months, mothers will be transferred/transitioned into a Community Adult Adherence Club.									
Initial implementer/ location details	Adopted/ scaled out by DOH	Type of ART delivery model	Population differentiation components		Model differentiation components	Building blocks			Evidence (published/ grey)	Resources		
MSF/M2M pilot, Khayelitsha, South Africa	No	HCW-managed group	<i>Sub-pop</i>	Post-partum women and their infants 10wks – 18 months	Caters for sub-pop only ↓ Post-natal mother ART refill/clinical frequency ↓ Mother-infant pair health service	When	Monthly from 10 wks to 6m old then 3 monthly (high-risk additional weekly community-based check up)	Infant same (aligned) Mother 3 monthly if on FP otherwise 6 monthly (high risk if not reclassified as low risk by 6 months, still continue to see monthly)	None yet (new pilot started 2016)	MSF early outcomes/ lessons presentation		
			<i>Clinical</i>	Low- and high-risk pairs (high risk Mother: VL >1,000 after 28 wks/no VL in last 3m/On ART <12 wks prior to delivery/diagnosed with HIV >28 wks or in labour or immediately post-partum/ Chorioamnionitis/ prolonged rupture Infant: Born <37 wks)	Task shifting ↑ Peer support (other HIV+ post-natal women)	Where	PHC	Who			LHCW	Post-natal club nurse
			<i>Context</i>	Urban/high burden/generalized epidemic		What	Mother: ART refill Structured adherence/baby care & dev support Infant: CTX refill/ deworm/Vit A	Mother: clinical HIV review/labs (VL)/FP/pap smear Infant: immunization/ growth check/neuro dev check HIV rapid				
			Referral mechanism	Nurse sees each pair at each visit <i>Self-referral/LHCW referral for HRMIP from home visits</i> If child tests positive, removed from post-natal club and returned to ART service paedS SOC			Which service	Infant follow-up service/baby wellness clinic (not ART service)				

Model name	Post-partum Women Integration into Adherence Clubs		Women at their first visit to the ART service post-partum are offered the chance to join a standard Adherence Club run in the community for adult stable patients. They are required to continue attending the infant follow-up service for their infant's HIV follow up, immunizations and monitoring.							
Initial implementer /location details	Adopted/ scaled out by DOH	Type of ART delivery model	Population differentiation components		Model differentiation components	Building blocks			Evidence (published/ grey)	Resources
							ART refill	Mother HIV clinical		
Desmond Tutu Foundation pilot, Gugulethu, South Africa	No	HCW-managed group	<i>Sub-pop</i>	Post-partum women	Sub-pop can receive care with other adult family members – Partial family approach	When	4 x 2 monthly 1 x 4 monthly (5 times per year)	Annual	Initial outcomes only – low retention within club model (61%) but no overall retention in care (RIC) data/ comparison data to women who choose to receive care at ART clinic ↑ VL suppression (41)	Zerbe et al (2016) AIDS poster presentation
			<i>Clinical</i>	Stable mother VL <1,000		Where	Community venue			
			<i>Context</i>	Urban/high burden/ generalized epidemic		Who	LHCW	Outreach nurse		
					What	Weight/symptom screen ART refill Labs (by nurse after group) Referral to facility	Mother: ART rescripting clinical HIV review			
					Referral mechanism	Self-referral/LHCW referral/referral from infant follow-up service to facility ART service Breastfeeding women are removed from the club model and returned to SOC if become clinically unstable (incl. high VL) or miss their club visit >5 days				
					Which service	ART service				
				↓ post-natal mother ART refill/clinical frequency Task shifting ↑ Peer support						

Model name	MCH Integrated Into ART Services with appointment spacing		ANC and post-natal care services are integrated into the ART service with a midwife working within the ART service. Pregnant women are able to receive their ANC and HIV/ART management at the ART clinic. Stable PFW receive 3-monthly ART refills throughout. During pregnancy, they attend monthly for ANC care, one of which is aligned with their ART refill visit. Post-natal women attend with their infants according to the immunization schedule with ART refill visits aligned to these dates. Infant follow-up care takes place at the ART service, but women do have to attend another service on the same day for the actual immunization, which is not stocked at the ART site. Delivery takes place at delivery sites.						
Initial implementer /location details	Adopted/ scaled out by DOH	Type of ART delivery model	Population differentiation components		Model differentiation components	Building blocks		Evidence (published/ grey)	Resources
							ART refill and integrated clinical review		
Hope/CASM Cote d'Ivoire	No	Facility-based individual	<i>Sub-pop</i>	Pregnant and post-partum women	↓ Post-natal mother ART refill/clinical frequency ↓ Mother-infant pair health service Unclear whether allows for sub-pop to receive care with other family members	When	3 monthly During ANC: attend clinic monthly for ANC care During post-natal care: attend clinic aligned with immunizations	↑ Maternal retention (100%) (42) ↓ transmission rate at 6 wks (0%) (42)	CDC presentation A Ekra 2016
						Where	All at centralized specialized ART service (Immunizations aligned on same date but at different service)		
			Who	Midwife Community counsellor					
			What	Mother: ANC care/post-natal care ART refill Clinical review ART rescripting Labs Infant: PCR and rapid test CTX refill Baby follow up (other than immunizations)					
			Referral mechanism	Unknown for MCH					
			Which service	ART service					
			<i>Clinical</i>	Stable on ART <i>CD4 >500 and VL undetectable for >12 months</i>					
			<i>Context</i>	Urban/high burden/ generalized epidemic					

Non-ART delivery adherence support models for pregnant and breastfeeding (post-partum) women but could easily be added/aligned service to existing model

Model name	Mentor Mother Models		Service models differ by country/implementing partner. Broadly, mentor mothers based at facilities/communities provide both individual and group support sessions to HIV-positive pregnant women and new mothers.					
Initial implementer /location details	Adopted/ scaled out by DOH	Type of ART delivery model	Population differentiation components		Model differentiation components	Building blocks	Evidence (published/grey)	Resources
Mothers2 mothers, multi-country (similar models implemented by different service providers throughout the region, including EGPAF-supported sites)	No	Could be HCW-managed group model/ individual out-of-facility	<i>Sub-pop</i>	Pregnant and post-partum women	Caters for sub-pop only Task shifting ↑ peer support		↑ retention for infant 6-week testing (43)	Model description (44) External evaluation outcomes – Shmidt IAS 2015 oral presentation Many different versions of this model of care
			<i>Clinical</i>	on ART				
			<i>Context</i>	Rural/peri-urban/high burden/generalized epidemic				

Part 5. Moving forward – areas for discussion

As evident in this review, many different approaches have been taken to address the varying considerations for families. Much variation exists between the models currently in place. For the most part, the models have already adopted some or all of the WHO recommendations for service delivery, including decentralizing care to primary health care clinics, integration of ART and MCH services, and task shifting.

In order to move beyond current experience and guidance towards developing a DSD framework for families, several issues must be addressed. The first is to identify common policies and embedded practices that guide HIV management for children, adolescents and PBFW in specific contexts, and to understand whether they create conducive enabling environments for DSD for families. Thereafter, consideration of key differentiation elements must follow – from the clinical characteristics of each specific population that guide eligibility for entry into and exit from a DSD model, to the characteristics of the specific population themselves, such as their behaviours and needs that may need be taken into account, and to the context in which the families or specific populations are situated in (particularly rural-urban, HIV burden and health system resource capacity).

Once these elements are clearly articulated, the next step is to consider the types of ART delivery models that would best suit families, and whether these should be similar to adult models that are currently in place (facility-based individual, out-of-facility individual, health care worker-managed group, or client-led group). Thereafter, the building blocks of who, where, when and what can be populated, and considerations for additional building blocks could be discussed. Addressing and coming to agreement on these key issues will support the development of a DSD framework for families.

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