



## **The Design, Implementation, and Effectiveness of Teen Models of Care:**

Lessons from MSF Supported Programmes Providing Treatment and Care for Adolescents Aged 10 to 19 living with HIV in Malawi and Uganda



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Photo captions cover page:

Young patients attending an MSF “Teen Club” for HIV-positive adolescents in Chiradzulu district.

# THE DESIGN, IMPLEMENTATION, AND EFFECTIVENESS OF TEEN MODELS OF CARE:

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Treatment and Care for Adolescents Aged 10 to 19  
Living with HIV in Malawi and Uganda

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# TABLE OF CONTENT

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<b>ACKNOWLEDGEMENTS</b>	<b>6</b>
<b>ABBREVIATIONS</b>	<b>7</b>
<b>EXECUTIVE SUMMARY</b>	<b>8</b>
<b>1. BACKGROUND</b>	<b>12</b>
<b>2. METHODS</b>	<b>14</b>
<b>3. DESCRIPTION AND IMPLEMENTATION OF THE TEEN MODEL OF CARE</b>	<b>16</b>
<b>3.1 Initial Objectives and Expected Outcomes</b>	<b>16</b>
<b>3.2 Target Population</b>	<b>17</b>
<b>3.3 The Intervention</b>	<b>17</b>
3.3.1 Progressive Organisation of Adolescent Clubs	17
3.3.2 Staffing	18
3.3.3 Clinical Management	19
3.3.4 Disclosure	20
3.3.5 Adherence Counselling: Individual Session	21
3.3.6 Educational Group Sessions: Adaptation of the Baylor Curriculum	21
3.3.7 Mental Healthcare and Social Support	22
3.3.8 Sexual and Reproductive Health and Rights	22
<b>3.4 Monitoring and Evaluation Systems</b>	<b>23</b>
<b>4. EFFECTIVENESS OF THE MODEL OF CARE</b>	<b>24</b>
<b>4.1 Arua, Uganda</b>	<b>24</b>
4.1.1 Trends in Client Characteristics	24
4.1.2 Trends in Treatment Outcomes	24
<b>4.2 Chiradzulu, Malawi</b>	<b>26</b>
4.2.1 Trends in Client Characteristics	26
4.2.2 Trends in Treatment Outcomes	28

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<b>5. DISCUSSION</b>	<b>32</b>
5.1 Treatment Outcomes	32
5.2 VL Monitoring and Increased Frequency for Vulnerable Patients	34
5.3 Adolescent Peers: Low-cost Counsellors or Much More?	34
5.4 An Evolving Treatment Landscape	35
5.5 Other Activities	35
<b>6. CONCLUSION</b>	<b>38</b>
<b>7. KEY RECOMMENDATIONS</b>	<b>40</b>
1. Scheduling	40
2. Viral Load Testing	40
3. Disclosure	41
4. Adolescent Peers	41
5. Poor Adherence – Multiple Components	41
6. Mental Health Assessment and Care	42
7. Transition to Adulthood	42
<b>REFERENCES</b>	<b>44</b>

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Watch MSF Eastern Africa's video on teen clubs where HIV-positive teens come to share experiences, encourage, and support each other on how they can live positively:

[Video: Teen club in Chiradzulu, Malawi](#)



## ABBREVIATIONS

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ALHIV	Adolescents living with HIV
CCMT	Complex Case Management Team
CI	Confidence Interval
CO	Clinical Officer
CTC	Comprehensive Teen Club
DBS	Dried Blood Spot
DHOS	District Hospital
DRC	Democratic Republic of Congo
EAC	Enhanced Adherence Counselling
EMR	Electronic Medical Record
FGD	Family Group Day
ICD	Intensive Clinic Day
ITS	Interrupted Time Series
M&E system	Monitoring and Evaluation system for programmatic data collection
MH	Mental Health
MOH	Ministry of Health
MSF	Médecins Sans Frontières
PHC	Peripheral Health Center
PHQ	Patient Health Questionnaire
PM	Peer Mentor
POC	Point-of-Care
SRHR	Sexual and Reproductive Health and Rights
STI	Sexually Transmitted Infection
VL	Viral load
YFS	Youth-friendly service

### Antiretroviral Therapy

ART	Antiretroviral Therapy
DTG	Dolutegravir
INSTI	Integrase Strand Transfer Inhibitor
NNRTI	Non-Nucleoside Reverse Transcriptase Inhibitor
PI	Protease Inhibitor

# Executive Summary

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This “lessons learned” report presents a thorough documentation of the implementation process of the models of care for adolescents (aged ~10–19 years) living with HIV (ALHIV) in two HIV programmes supported by MSF. The first is in Arua, a town in the West Nile Province in Uganda and, the second, in Chiradzulu rural district, Southern Malawi. Both countries are among the top 15 countries to be affected by HIV in the world. Whilst Arua is in a lower HIV-prevalent setting, Chiradzulu district remains one of the most affected regions of Malawi.

Research demonstrated that in both contexts, a high proportion of adolescents were found to be failing despite receiving HIV treatment<sup>1,2</sup> MSF’s internal reports confirmed this fact, so a decision was made to focus on the adolescent age group and develop a “teen” model of care customized to the specifics of each context.

In Uganda the project was centrally based within the regional hospital. The approach was centred around Peer Mentors (PMs) – adolescents living with HIV who want to use their own personal experiences to help and support others. Additional activities, such as sexual reproductive health and rights (SRHR) consultations, prescription of contraception, and mental health (MH) support were implemented in a second round.

The considerably rural setting of Southern Malawi proved a challenge when it came to decentralising the same model for ten rural health centres and one district hospital. Here, two separate interventions were developed for adolescents who were stable (having confirmed viral suppression) and those who were unstable. For the former group, it was

a Saturday Comprehensive Teen Club (CTC), and for the latter, a weekday intensive clinic day (ICD) initially focused on virologic follow up, enhanced adherence counselling (EAC), and a rapid switch to second-line treatment when needed. The varied activities were progressively implemented: Antiretroviral Therapy (ART) regimen optimization, psychosocial assessment and HIV disclosure when needed, SRHR consultation actively proposed and contraception when asked, and, finally, mental health care and social support).

The development of these models of care started in the last quarter of 2017, and components were progressively introduced in a continual cycle of planning, implementation, review, and new propositions.

The first step was organization and appointments were scheduled according to the HIV disclosure status with the teens being included in group activities once they were fully disclosed. The groups were then structured according to ages – young adolescents (below 14 years) and older ones – and the groups were seen at different

times/days as their concerns on sexual and reproductive health and rights (SRHR), as well as other topics differed. SRHR activities, including contraception, only succeeded when a midwife was integrated into the team, permitting SRHR consultations to occur during the teen-specific days (and outside of the usual Family Planning days). Finally, we used a multidisciplinary approach for managing those individuals in complex situations. Further, we developed mental health care and social support, mainly after the COVID-19 lockdown period ended. This additional step is not detailed in this document as it falls outside of the time scope of the report.

Although the pathways to get there differed between sites, by mid-2020, both projects were providing the following:

- ▶ Medical care, delivered from a patient-centred approach.
- ▶ Six-monthly virologic follow-up with point-of-care (POC) VL testing.
- ▶ Specific organization and package of care for adolescents.
- ▶ Regularly re-assessed disclosure processes.
- ▶ Peer support provided as a component of management strategies for treatment failure and/or educational sessions.
- ▶ SRHR, including contraception prescription.
- ▶ Multidisciplinary approaches, with social issues integrated into the management of complex cases.
- ▶ Mental health and social support provision on several complex cases.

This report delves into the implementation and effectiveness of the models of care implemented from 2017 to the second quarter

of 2020. The qualitative section provides a detailed overview of the implementation process, while the quantitative section assesses the effectiveness of these models of care. Treatment outcome trends were analyzed for five reporting quarters (2016-2020) in Uganda and 24 reporting quarters (2014-2019) in Southern Malawi. Varied methodologies and periods were employed to accommodate the availability of data for analysis.

What was observed from the quantitative analysis over the course of the implementation:

- ▶ The proportion of still-in-care remained constantly high across both projects.
- ▶ The proportion with VL suppression and VL re-suppression increased substantially in Chiradzulu.
- ▶ In Arua, VL suppression and VL re-suppression changed less drastically as rates were already high at the start of the implementation period (75% and 53% respectively).

At the end of 2019 (before COVID-19 lockdowns) it was observed that:

- ▶ Approximately 90% of adolescents were still in care in both projects.
- ▶ VL coverage was 83% in Arua and 90% in Chiradzulu.
- ▶ 76% and 83% had VL suppression in Arua and Chiradzulu respectively.
- ▶ 76% and 60% had VL re-suppression in Arua and Chiradzulu respectively.

Further, it was observed that VL suppression was higher among adolescents on NNRTI or INSTI (dolutegravir) based regimens compared to those on PI-based (or third-line) regimens. This difference reflects the rapid

switch of regimens for adolescents failing on NNRTI-based regimens and the transition of stable adolescents on NNRTI to INSTI based regimens during the implementation period.

In conclusion, these two pilot projects had good results when compared to global standards. While the increase in virologic success is likely multifactorial, and it is not possible to attribute the improvement of the indicators to a specific activity due to the lack of a control group and from different activities being implemented at the same time, the high rate of retention in care and the vastly elevated VL coverage might be

attributed to the quality of the care provided to the adolescents. In fact, in both contexts, access to VL testing was constant. In a few instances, patients with irregular follow ups or who were late to appointments were not tested and assumed to have a high VL given the likelihood of occurrence when tested.

Implementing adolescent-friendly services and adapting these models to the resources available locally, could contribute to extending the effectiveness of dolutegravir (DTG) recently introduced to adolescents in many contexts globally.

### **The key lessons learned from this implementation were:**

- ▶ **Schedule all adolescents on the same day(s);** preferably during out-of-school hours.
- ▶ **Ensure disclosure is a repeated and ongoing process** and not an on/off one.
- ▶ **Maintain close collaboration between clinicians and counsellors** to continuously transmit information to the changing and evolving concerns of teens.
- ▶ **Organize sessions by age band**, separating the pre-pubescent adolescents from older ones. Full HIV disclosure is recommended before integrating the adolescents into group activities.
- ▶ **Include SRHR in the package of care.** Health workers and peers must be trained to address the specific concerns of adolescents. For instance, injectable Depo-Provera is the preferred contraception in adolescent girls aside from condoms.
- ▶ **Recognize peers are an important asset** to conveying messages and sharing positive experiences. While peers are useful actors in the management of teens, they should not be solely responsible for managing the cases of adolescents failing on treatment.
- ▶ **Perform a VL every six months** for this vulnerable age group. POC VL, with same-day results, permits a rapid management of the unsuppressed patients, and requires logistic organization in rural contexts.
- ▶ **Utilize a multidisciplinary team** – clinicians, counsellors, psychologists, social workers, and peers – to address the complex situations faced by some adolescents.



The younger the person, the more difficult it is to deal with HIV on a psychological level. "Children feel as if they did something wrong, as if it's their fault for being HIV positive even as many were born this way. They associate their medication with some kind of disturbance", says an MSF social worker in Chiradzulu.

# 1. Background

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Adolescents aged 10–19 years living with the human immunodeficiency virus (ALHIV) are a vulnerable population at a critical juncture between childhood and adulthood<sup>3</sup>. In 2017, it was estimated that 1.8 (Uncertainty Bound:1.3 – 2.3) million adolescents were HIV-positive globally, of whom over 80% lived in sub-Saharan Africa<sup>4</sup>.

This population is composed of a heterogeneous group of those who acquired HIV through mother-to-child transmission (perinatally or postnatally through breastfeeding) and those who acquired HIV through sexual transmission. ALHIV face a multitude of challenges including harsh life experiences. These could range from the death of their parents or siblings leading to them assuming welfare and financial responsibility of self and of others<sup>5-8</sup>, difficulty completing school, stigma and discrimination, potentially impaired growth and sexual development leading to questions on their ability to be sexually active and bear children in the future. Collectively or individually, these stressors are known to create conditions of poor adherence to treatment, leading to poorer treatment outcomes and secondary transmission<sup>9-17</sup>.

The current recommendations are to provide youth-friendly services (YFS) to address the challenges and meet the specific needs of ALHIV<sup>18-20</sup>. However, these services are often lacking, and adolescents tend to transition abruptly from paediatric to adult care<sup>21,22</sup>. A systematic review published in 2019 registered a very small number of studies on recent interventions aiming to improve retention and adherence to HIV care among adolescents and youth in low-income

countries. Only ten studies/interventions were eventually selected, documenting either no impact (placebo trial, eHealth intervention), mixed results (youth-friendly clinics, ART support groups), or promising outcomes (economic support, comprehensive home-based social support)<sup>23</sup>.

From 2017 onward, MSF Operating Centre Paris developed programmes in Malawi and Uganda aiming to improve treatment outcomes among ALHIVs. Drawing on the experience of other actors, especially Baylor College of Medicine in Malawi, MSF implemented two different approaches combining various elements of the YFS model of care. The intention was to create a friendly space that would include routine medical and virological follow-up alongside support to disclosure, educational sessions (not only on treatment adherence but also in relation to sexual reproductive health, internalized stigma, and empowerment) and a setting to meet peers for socialization and for recreation.

In Uganda, MSF developed a project within the regional reference hospital of Arua City, located in the West Nile province, which is not the hardest hit by the HIV epidemics in the country. As the regional hospital, severe cases including unstable patients are referred here

from peripheral health centers. A dedicated “adolescent day” was set up during the week with peer support. Peers played a large role in educational activities in group and individual sessions for those failing treatment.

In Malawi, interventions were deployed in a “HIV high-burden” rural district, mainly at the level of peripheral health centres (PHC), where MSF managed the teens’ project entirely. The intervention here was a Saturday Teen Club for stable (defined as confirmed viral suppression) adolescents and a weekday intensive clinic for unstable adolescents.

After three years of implementation, the treatment outcomes of ALHIV supported by MSF have improved. The goal of this “lesson learned exercise” is to provide a thorough documentation of the implementation process of the models of care in the two countries and to highlight their respective strengths and weaknesses with a view to guiding future interventions and influencing policies for adolescents living with HIV. In addition, the effectiveness of each approach is assessed by looking at temporal trends in key treatment outcomes.

### **Box 1: Definition of an unstable adolescent**

Stability is defined by the health and the viral load (VL) result of an individual. Following the WHO recommendations, the VL threshold is set at 1000 copies/ml. Those displaying symptoms and/or above this threshold are therefore considered unstable.



Young people living with HIV need a safe and dedicated space to discuss, follow-up and treat their condition, protected from discrimination and stigmatisation.

# 2. Methods

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This report's description of the implementation process for the projects draws on information available in quarterly and annual reports, field visit reports and the synthesis of annual reviews of program objectives, as well as direct observations and exchanges with field staff.

To assess the effectiveness of the models of care in improving treatment outcomes, trends in client characteristics and key indicators were analyzed.

## The key indicators were categorized as follows:

- ▶ **Seen** - The number of adolescents with either a recorded clinical visit, ART prescription or refill or lab test in the reporting quarter.
- ▶ **Still in Care** - The number of adolescents with a subsequent visit 9 to 15 months after first visit in the reporting quarter amongst adolescents in the Seen category.
- ▶ **VL Coverage** - The number of adolescents with a VL test in the 12 months prior to first visit in the reporting quarter among adolescents in the Seen category.
- ▶ **VL Suppression** - The number of adolescents with VL<1,000 copies/ml amongst adolescents in the Seen category with a VL test in the reporting quarter.
- ▶ **VL Re-suppression** - The proportion of adolescents with VL<1,000 copies/ml at the repeat VL test among individuals with a high VL >1,000 copies/ml in the reporting quarter.\*

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\* Adolescents with a high VL>1,000 copies/ml in the 12 months prior to the reporting quarter and whose tests were being repeated were excluded from the denominator to avoid duplication.

For this analysis, routine programmatic data was extracted from electronic medical records (EMR). Different analytic strategies were then adopted for each project:

- ▶ In Arua, given the limited EMR data, trends in treatment outcomes were assessed over five reporting quarters spanning 2016 to 2020 with only one reporting quarter showing pre-implementation comparisons.
- ▶ In Chiradzulu, interrupted time series (ITS) analysis using segmented regression<sup>24,25</sup> was used to test whether treatment outcomes improved after the implementation of the model of care. Quarterly data over a 4-year pre-implementation period (2014-2017) and a two-year implementation period

(2018-2019) was analyzed. Data from 2020 was not included in the ITS analysis as services were severely disrupted during the COVID-19 pandemic. The report presents the estimated value (95% confidence intervals) from the post-implementation trend and the absolute difference at the end of the observation period (2019-Q4) between the estimated value and the counterfactual value (obtained from extrapolating the pre-implementation trend). Thus, a significant positive difference indicated that the intervention had a positive effect on outcomes above what was expected from the pre-implementation trend and vice versa for negative absolute differences.



Many teenagers living with HIV in sub-Saharan Africa struggle to adhere to antiretroviral therapy. While some HIV clinics resort to strict rules which sometimes include the threat of a punishment for those who do not follow them, adapting the model of care to the needs and expectations of this particular age group seems the best way to encourage their adherence to therapy.

# 3. Description and Implementation of the Teen Model of Care

## 3.1 INITIAL OBJECTIVES AND EXPECTED OUTCOMES

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The overall objective of the teen model of care was to provide adapted services to adolescents 10–19 years old living with HIV and to address their high levels of virological failure.

### Specific Objectives

- ▶ **Improve medical management** by providing more frequent virologic coverage and optimization of ART regimens.
- ▶ **Provide a comprehensive package** of psychosocial and educational support, including mental health care.
- ▶ **Reduce adherence issues** firstly by organizing a coherent disclosure process for the youngsters and secondly through a multidisciplinary comprehensive approach for the complex cases.

### Expected Results

- ▶ Improved viral suppression rates.
- ▶ Prevention of treatment failure and achieving a better quality of life for the HIV-affected adolescents.

## 3.2 TARGET POPULATION

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Table 1: Number of children and adolescents actively followed in the Arua and Chiradzulu HIV cohorts in 2018

	Arua	Chiradzulu
< 15 years	396	1,811
10-19 years	474	2,045

## 3.3 THE INTERVENTION

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The intervention was a designated ART clinic day(s) delivering a comprehensive set of care protocols encompassing social as well as clinical needs including:

- ▶ Friendly spaces for socialization.
- ▶ Clinical consultations and ART rapid refill for those deemed stable.
- ▶ Virological follow-up and drug resistance testing when needed.
- ▶ Adherence detection and adherence support when needed.
- ▶ Educational sessions and support to encourage disclosure.
- ▶ Psychosocial evaluation and mental health care, as well as social support, mainly developed after 2020.
- ▶ Sexual and reproductive health and rights and family planning access.

### 3.3.1 Progressive Organisation of Adolescent Clubs

In Arua, the adolescent's club day was easy to organize as only adolescents were scheduled on that specific day. Visits

were spaced every two months or earlier if required. Children less than 12 years old were scheduled on Family Group Days (FGD) where they attended the clinic with their caregiver. During FGD, disclosure was made or repeated, and information given to the child about the reason why he/she was taking pills (and why it was important to continue taking them). Further support was given to the caregiver, according to the identified reasons why the recommended treatment was given or not to the adolescent.

In Chiradzulu, the implementation of the CTC was more progressive, given the number of health centres in the district. Over time, the criteria of who can attend needed to be adjusted as follows:

- ▶ All adolescents and younger children (7 to 10 years) were initially enrolled in the Saturday CTC to promote peer interaction. Saturdays were chosen as missing school was a major concern. However, the cohorts at some health centres were large and busy, and there was a need for more lengthy clinical consultations for unstable adolescents (Box 1). In addition, it became clear that the age range was too broad and the group too diverse to promote good socialization. Further, those who had never received disclosure were mixing with those who had received full disclosure, adding complexity to the organization of educational and disclosure sessions.
- ▶ Thus, unstable adolescents and undisclosed children were scheduled for weekday visits where MSF was already running the Intensive Clinic Days (ICD) for adults with suspected treatment failure and smaller children, with the goal of more thorough and individual interaction.

- ▶ Later, adolescents were split into two further age groups (10 to 13 and 14 to 19 years) and, for each group, the visits were spaced on separate Saturdays every two months.
- ▶ In 2020, adolescents attending clinics with the largest visit volume (Nमितambo PHC and the DHOS clinic) were split into three age groups (10 to 12 years, 13 to 16 years, and 17 to 19 years) and for each group, visits were scheduled on separate Saturdays every three months. This also facilitated the implementation of the “transition-to-adult” project for the 17 to 19-year-olds.

In 2019, in Chiradzulu, a rotational system was established to manage the flow of adolescents participating in the different activities during CTC. The system included:

- ▶ Assigning adolescents at registration to groups of approximately 20 individuals so that two or three groups were formed. The first group started early with the ones from whom blood should be drawn on arrival as indicated in their registration file or medical consultations. The second group started with educational group sessions while the third group worked on another activity such as fast-track refill, recreation, or psychosocial assessment. Once each group finished their activity, they moved to the next activity on the rota.
- ▶ Referring adolescents to individual counselling on a needs basis as deemed by the clinician.
- ▶ Management of fast-track refills by the Ministry of Health (MoH) pharmacy assistant.

The intensive clinic days in Chiradzulu were progressively organized in all facilities during 2018. However, in contrast to CTC,

the organization and amenities of these days were deemed not adolescent-friendly and group activities and socialization were not possible. Therefore, booking was reorganized to create a specific adolescent day whereby all unstable adolescents would attend ICD on the same weekday.

Finally, during pandemic lockdowns, a minimum package of care was provided. In Arua, adolescent days were stopped, and consultations maintained only for patients with specific issues or high VL on their most recent test. Refills were organized every three months.

In Chiradzulu, visits were spaced to every three months, routine VL testing was stopped whilst targeted VL testing continued. Furthermore, some CTCs were cancelled for three months.

### 3.3.2 Staffing

At the projects, the core team consisted of an activity manager (MSF), registration clerks (MOH), clinical officers (CO) (MOH-Arua, MOH-MSF-Chiradzulu), counsellors (MSF), lab technicians (MSF), and drug dispensers (MoH). All MoH staff working on Saturdays received incentives. In addition, in Chiradzulu, a team of MSF chauffeurs were also made available to transport blood samples to the POC lab hubs.

PMs were introduced from the outset in Arua and later in Chiradzulu.

In Arua, PMs were put at the forefront of adolescents failing first-line treatment. After a short training (around three days), they were asked to perform both individual and group sessions with the adolescents facing poor adherence. They were also asked to actively

participate in educational sessions, under the supervision of MSF counsellors. In 2018, to lessen the burden and peers' responsibility, counsellors were asked to conduct the first assessment of adolescents failing treatment. These adolescents were then referred on to peers for further support only after excluding those with social or psychological issues or poor adherence due to drug side effects.

In contrast, in Chiradzulu, the peers were used in the teen clubs as youth group supervisors, helping the adolescents to move from one activity to another and with some group work exercises during educational sessions run by counsellors. Peers were then progressively trained to animate the educational sessions. However, they did not perform individual sessions with adolescents with poor adherence like their counterparts did in Arua.

In both projects, PMs received a short training on SRHR.

### 3.3.3 Clinical Management

The main thrust for clinical management was to increase access and frequency of VL monitoring (Box 2) and to take action (rapid confirmation of failure after individual adherence sessions, switch to second-line if needed or genotyping to decide on the third-line regimen) for those suspected of failure. Further, screening for OI was done according to the WHO recommendations. All these measures had been progressively put in place prior to the implementation of the teen model of care. Noteworthy, MSF introduced VL testing every six months for children and all adolescents under 15 years from 2015, but it became routine in 2017 for all adolescents.

In both projects, specific training was given to COs via an advanced adolescent HIV training programme performed in 2018. Additionally, their skills were further strengthened thanks to on-the-job sessions carried out during field visits.

#### Box 2: Access to VL Monitoring

The MoH algorithms for routine monitoring using VL recommended testing following ART initiation is to be at month six, month 12 and every year thereafter in Uganda, and, at month six, month 12 and every two years thereafter in Malawi.

For both projects, the MoH standard for VL testing was the use of dried blood spot (DBS) for specimen collection and the subsequent transport to centralized testing laboratories<sup>26</sup>. However, this system did not necessarily improve coverage and the turn-around time for results was too long.

Therefore, in 2013, MSF introduced POC VL monitoring using SAMBA<sup>®</sup> in collaboration with Helen Lee and her team from Cambridge University and funded by UNITAID<sup>27,28</sup>. Once the research ended in 2017, MSF continued providing access to VL monitoring either through SAMBA or Genexpert<sup>®</sup> and bore most of the financial and HR burden.

Location-specific detail:

- ▶ In Arua, on-site VL testing using SAMBA was made available immediately from September 2013.
- ▶ In Chiradzulu, on-site VL testing using SAMBA was introduced in a stepwise manner, starting with the district hospital and four of the ten peripheral health centres as part of the study. ART patients at the six other PHCs in the district only had access to targeted viral load testing (i.e., when clinical and/or immunologic failure was suspected), whereby blood samples would be brought to and tested at DHOS's SAMBA laboratory. After the research ended, three of the on-site POC-VL testing were made into mini-lab hubs. The other two sites closed. Samples were transported from each HC to one of the hubs and same-day results communicated back to the staff via a mobile phone message. In 2018, SAMBA was replaced by Genexpert.

In both projects, when the national DBS system became more reliable (with shorter turn-around time for results), a mix of VL testing using the national DBS system and MSF-led POC was used to reduce the cost. However, the DBS system still has limits with loss of sample and often long TAT for results back to the facilities.

### 3.3.4 Disclosure

Following MSF guidelines, the disclosure process was organized as four steps with two sessions for partial disclosure and two sessions for full disclosure. HIV is normally named during the first full disclosure session, and this should be done before the child reaches the age of 12. However, the whole process was adapted to each individual and as stated by WHO: "Disclosure of diagnosis is not an isolated event but rather a step in the process of adjustment by the child, caregivers, and the community to an illness and the life challenges that it poses"<sup>29</sup>.

Observations from the field evidence that:

- ▶ The health workers (especially the clinicians) were not always aware of the level of disclosure of the adolescent.

- ▶ The level of disclosure, when indicated in the file, was not always representative of the knowledge of the individual: some were supposed to be partially disclosed but were unable to explain why they were taking drugs, even after recent disclosure sessions, others were fully disclosed but had forgotten the name of the disease.

These issues are common for many diseases and often met while doing fieldwork. Experience, however, showed that when a child or an adolescent does not know why he/she is taking pills every day while seeming otherwise healthy, the treatment is stopped sooner or later.

Therefore, the organization for disclosure was updated by:

- ▶ Re-assessing the level of disclosure at the beginning of the implementation period.

- ▶ Starting the disclosure process from around seven years of age and recognizing the need for additional explanations adapted to each step of the child’s cognitive development. This was a continuous process managed by the team that included the parents and/or caregivers.
- ▶ Clearly indicating the level of disclosure in the medical files and systematically re-assessing the disclosure level during medical consultations (especially to those aged 10 to 15 years old) by asking, “do you know why you are taking drugs?”. According to how the adolescent responded, it was easy for the clinician or the counsellor to determine if the session had to be repeated/completed. The adolescent was then referred back to the counsellor, but progressively, the clinicians shared this responsibility with them and by mid-2020, more and more clinicians learnt to give information (why the number of pills was changed, why he/she was sent to have blood drawn, what was the result of the VL test, etc.) to children and adolescents.

### 3.3.5 Adherence Counselling: Individual Session

The WHO recommendation is for individuals with high VL ( $\geq 1,000$  copies/ml) to be given EAC followed by a repeat VL test within three months of the initial VL test. If the repeat VL remains greater than 1,000 copies/ml, treatment failure is confirmed, and patients should be switched to second-line ART<sup>30</sup>. The EAC sessions were conducted by counsellors in Chiradzulu and peer mentors in Arua.

### 3.3.6 Educational Group Sessions: Adaptation of the Baylor Curriculum

Educational group sessions were adapted from the comprehensive curriculum on HIV/AIDS developed by Baylor College of Medicine International Pediatric AIDS Initiative (BIPAI)<sup>31</sup> and other groups. The themes covered by the curriculum were:

- ▶ HIV Basics & Adherence
- ▶ Stigma & Discrimination
- ▶ Disclosure
- ▶ Puberty/ Hygiene
- ▶ Family Planning & Sexual Behaviour
- ▶ Gender Roles & Romantic Relationships
- ▶ Future Goals and Empowerment
- ▶ Sexual Gender Based Violence

In Arua, adolescent PMs started to conduct these sessions following theoretical and practical training.

In Chiradzulu, these sessions were initially performed by counsellors. In both projects, the groups were sometimes too large to allow good participation. In general, the curriculum was used as a guide on how to structure the educational sessions and allow much more interaction with the participants. These sessions were prepared in advance with the coaching of counsellors. The experience-sharing by peers was of great value. Participation was also topic dependent.

In total, there are 33 sessions, of which some are intended for specific age groups (10 to 14 years and 14 to 19 years) and several for caretakers.

### 3.3.7 Mental Healthcare and Social Support

In Arua, the MH activities were not developed. Social support was limited to transportation costs, especially for patients coming from the neighbouring Democratic Republic of Congo (DRC).

In Chiradzulu, the provision of screening and care for MH was progressive. The initial lengthy screening tool (PHQ-9<sup>32</sup>) was replaced by the ones adapted for adolescents (PHQ-A). Later, the shorter PHQ-4<sup>33</sup> to screen for depression and anxiety was introduced and allowed the counsellors to screen the patients. From 2020, the adolescents identified this way were referred to a complex case management team (CCMT) comprising one psychologist, two MH nurses and four social workers for further advice.

In both projects and before 2020, the social support mainly consisted of transportation costs (especially in Arua, for the adolescents coming from near DRC) and providing food to the most deprived. In addition, individual exceptions were considered but at a very small scale. In early 2020, a social anthropologist reinforced the team in Chiradzulu, but the pandemic lockdowns negatively impacted the realization of her recommendations until the measures were lifted.

The numbers supported this way were far from addressing the numbers in need. This approach is difficult to maintain, particularly in the absence of a strong social network for referral. More recently, the decision was taken to collaborate with a cash-transfer specialized association – “GiveDirectly”<sup>34</sup>.

### 3.3.8 Sexual and Reproductive Health and Rights

Educating all adolescents, including ALHIV, on SRHR is often difficult because of barriers within the teams themselves and/or the communities: the taboos on adolescent sexuality, fear of the parents’ reaction, and personal beliefs or reluctance, amongst other factors. There are also legal barriers, which are harder to overcome. Health workers often need to reflect first on teen sexuality to accept the idea that promoting family planning methods does not mean promoting “promiscuity”. This notion was discussed and alleviated in several workshops.

In Arua, SRHR consultations were initially provided outside the ART clinic as part of another service in the hospital. In 2019, a nurse was trained and started performing SRHR consultations for teens and providing contraception services within the ART clinic. Access to it was initially restricted to married young women (again, “legal issues”) but was progressively made accessible to single adolescent girls.

In Chiradzulu, sexual education and reproductive health information was included in the group session curriculum in 2018 but not in individual consultations, thus preventing the adolescents from easily accessing family planning methods. By the end of 2018, COs and counsellors were trained in SRHR (including termination of pregnancy). Individual consultations for SRHR and family planning methods were then introduced during CTC and ICD in the second quarter of 2019, following recruitment of one midwife. A challenge remains to include sexually transmitted infection (STI) prevention and treatment and SRHR education for boys.

### 3.4 MONITORING AND EVALUATION SYSTEMS

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In Arua, patient monitoring and follow-up were performed using data from the MoH EMR. An MSF-specific database was implemented from December 2018, to complete the

information that was not collected in the MOH database, particularly the disclosure process and EAC sessions.

In Chiradzulu, a specific MSF system was designed and implemented from June 2018. The MoH EMR system was used as complementary information.



A mentor to his fellow HIV-positive teenagers, Chilungamo helps MSF teams to manage the activity at Namibambo Health Centre in Chiradzulu district.

# 4. Effectiveness of the Model of Care

## 4.1 ARUA, UGANDA

### 4.1.1 Trends in Client Characteristics

Between 345 and 452 adolescents were seen at the clinic per reporting quarter (Table 2). Older adolescents (aged between 13 and 19 years) accounted for 69% of the individuals seen in Q1 2016, and this proportion increased steadily to 78% in Q3 2020. The number of adolescents on second or third-line ART regimens also increased over time, from 18% in Q1 2016 to 52% in Q3 2020. These trends are also reflected in individuals spending a longer time on second-line (from 1.2 to 3.0 years) and third-line (from 0.1 to 1.9 years) regimens. From 2018 onwards, it was also observed that partial replacement of NNRTI with INSTI (dolutegravir) based first-line therapies, and the introduction of these INSTI's into second and third-line regimens. Raltegravir was used for third-lines prior to DTG availability.

### 4.1.2 Trends in Treatment Outcomes

▶ The proportion of individuals still-in-care was high in all reporting quarters, at 87% in 2016 and 89% in 2020. VL coverage was also high at 75% or more in Arua. VL testing frequency seemed well-spaced, between 4.3 and 6.4 months from the last visit, in all reporting periods.

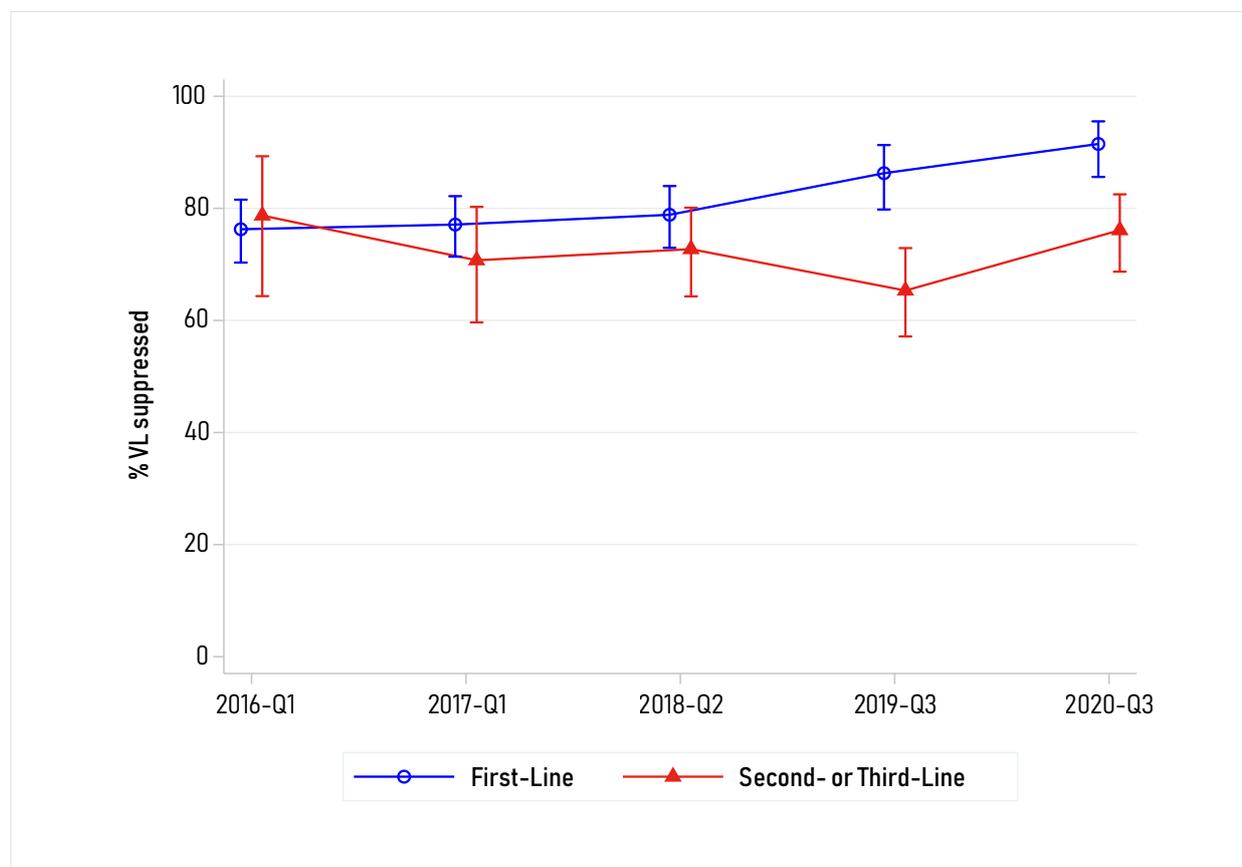
The changes observed between the first and last reporting quarter amongst individuals are listed below:

- ▶ VL coverage increased from 75% in 2016-Q1 to 87% in 2020-Q3 (Table 2, Test for trend:  $p < 0.01$ ).
- ▶ VL suppression improved steadily over time from 77% in 2016-Q1 to 83% in 2020-Q3. The test for trend was significant, as was the difference in trends between ART regimens (Figure 1). The proportion with VL suppression amongst individuals on first-line therapy increased steadily from 76% to 92%. In contrast, for individuals on second or third-line therapy, VL suppression was at 78% then decreased to 64% before returning to 76% in 2020-Q3.
- ▶ The proportion with VL re-suppression at the repeat test increased from 41% in 2016-Q1 to 76% in 2019-Q4, before falling to 47% in 2020-Q3. The test for trend was non-significant given the denominator (the number of individuals with a high VL ranged between 16 and 24 per reporting quarter) was relatively small. The drop in 2020 is due to the COVID-19 lockdown, as VL tests were performed only on those with suspect failure and delays with ARV delivery occurred, despite ART community delivery during the lockdown.

Table 2: Temporal changes in client characteristics and treatment outcomes (Arua, Uganda)

	2016-Q1	2017-Q1	2018-Q2	2019-Q3	2020-Q3	Overall Test For Trend
<b>CLIENT CHARACTERISTICS</b>						
Total seen (per quarter)	376	452	431	371	345	
<b>Age group (years)</b>						P<0.01
10-12	115 (31%)	118 (26%)	98 (23%)	78 (21%)	75 (22%)	
13-19	261 (69%)	334 (74%)	333 (77%)	293 (79%)	270 (78%)	
<b>Gender</b>						P=0.90
Male	186 (50%)	217 (48%)	214 (50%)	178 (48%)	174 (50%)	
Female	190 (50%)	235 (52%)	217 (50%)	193 (52%)	171 (50%)	
<b>ARV Line based on date start/switch</b>						P<0.01
1st-line	309 (82%)	316 (69%)	270 (63%)	185 (50%)	165 (48%)	
2nd-line	67 (18%)	134 (30%)	151 (35%)	168 (45%)	159 (46%)	
3rd-line	0 (0%)	2 (<1%)	10 (2%)	18 (5%)	21 (6%)	
<b>Median Years on ART [IQR]</b>						
Overall	6.0 [1.6,8.7]	6.3 [2.6,9.4]	7.3 [3.8,11.0]	8.0 [5.0,11.0]	9.0 [6.0,12.0]	
On 1st-line	5.4 [1.6,8.5]	5.6 [2.5,8.9]	5.9 [3.5,9.5]	5.9 [3.9,9.8]	6.2 [3.9,10.0]	
On 2nd-line	1.2 [0.7,1.7]	1.3 [0.5,2.4]	1.9 [1.3,3.3]	2.5 [0.8,3.6]	3.0 [1.6,4.2]	
On 3rd -line	-	0.1 [0.0,0.2]	0.2 [0.0,0.7]	1.0 [0.6,1.2]	1.9 [1.1,2.3]	
<b>TREATMENT OUTCOMES</b>						
Among clients seen	376	452	431	371	345	
<b>% Still-in-Care</b>	87%	82%	85%	91%	89%	P=0.01
	[83%,90%]	[78%,85%]	[81%,88%]	[88%,94%]	[85%,92%]	
<b>% VL test coverage</b>	75%	73%	83%	82%	87%	P<0.01
	[71%,79%]	[69%,77%]	[79%,87%]	[77%,85%]	[83%,90%]	
Among clients with VL test	283	331	359	303	300	
<b>% VL suppressed</b>	77%	76%	77%	76%	83%	P=0.06
	[71%,81%]	[71%,80%]	[72%,81%]	[71%,80%]	[79%,87%]	
Among clients with repeat VL test following high VL	17	19	12	22	15	
<b>% VL re-suppressed</b>	41%	53%	67%	76%	47%	P=0.42
	[21%,65%]	[31%,73%]	[37%,87%]	[55%,90%]	[24%,71%]	

Figure 1: Trends in the proportion with VL suppression among adolescents on first-, second- or third-line ART regimen (Arua, Uganda)



## 4.2 CHIRADZULU, MALAWI

### 4.2.1 Trends in Client Characteristics

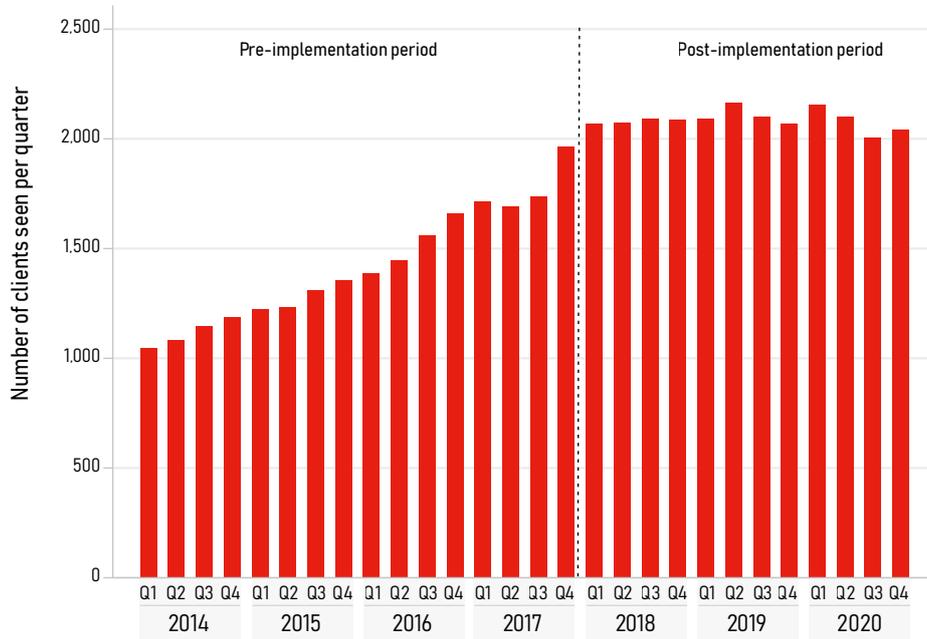
The number of adolescents seen across all health centres increased steadily from around 1,000 to 2,000 individuals per quarter in the pre-implementation phase and then remained at 2000 during the implementation period (Figure 2A). The composition of the adolescents seen per quarter remained constant or changed only slightly for certain characteristics: the proportion females (~50%), the proportion with more than four years on ART (~50%) and the proportion

aged between 10 to 14 years (40% to 50%) (Figure 2B). However, the proportion of adolescents ever having a VL test increased from 6% in the first quarter of 2014 to >90% from the last quarter of 2018 onwards due to increased access to POC-VL testing. Likewise, the proportion of adolescents on non-NNRTI-based ART regimens increased from 7% in the first quarter of 2014 to 99% in the last quarter of 2020, with the sharpest incline occurring between 2019 and 2020 (Figure 2B).

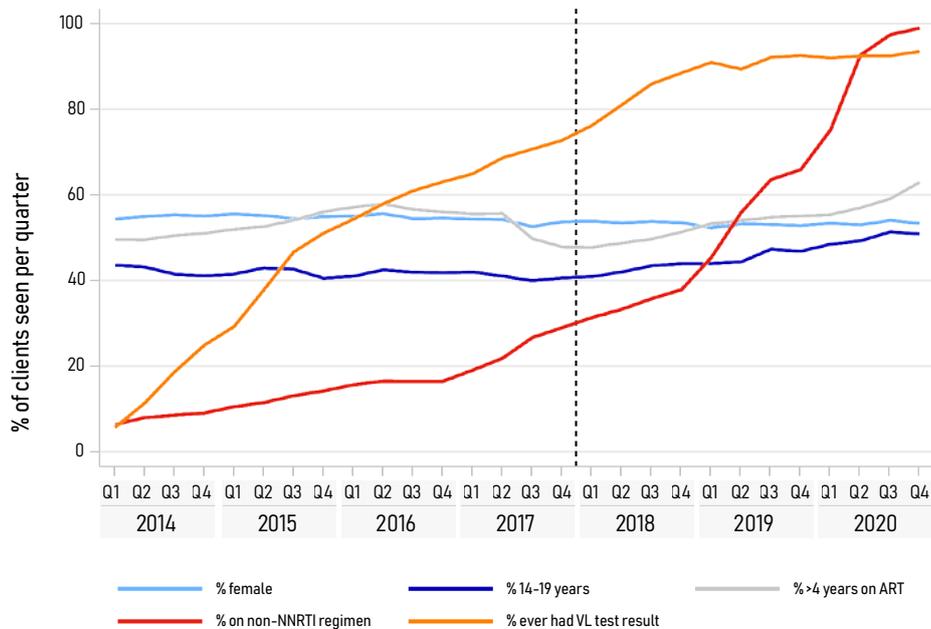
This is due to several factors. Firstly, those identified as treatment failures were rapidly switched to a PI-based regimen. Second, in 2019, those still on NNRTI or PI and stable were transitioned to DTG-based regimen if weight allowed.

Figure 2: Temporal changes in characteristics of clients seen per quarter (Chiradzulu District HIV teen cohort, Malawi).

A. Number of teens seen per quarter.



B. Profile of teens seen per quarter.



## 4.2.2 Trends in Treatment Outcomes

### Still-in-care 12 Months Later

The proportion of adolescents still-in-care was high across all reporting quarters (~90%), except during the second quarter of 2016 through to the third quarter of 2017 (Figure 3A), where it dropped slightly to below 90%. This was the period of handover of the whole HIV cohort from MSF/MoH shared management to MoH alone and when the data collection system was changed from an MSF-managed one to the national system. Some visit information may have been missed during this transition, which would explain the dip below 90% in the proportion still-in-care.

The ITS analysis confirmed that there was no difference in the proportions still-in-care between the pre and implementation periods as all three estimates (pre-implementation slope, change-in-level and change-in-slope) were non-significant. Thus, at the end of the observation period, the estimated proportion still-in-care was 93.4% [95% CI: 92.9, 93.8] and the difference between this proportion and the counterfactual value was 1.5 percentage points [95% CI: 0.0,3.0].

### VL Suppression

The proportion of adolescents with VL suppression increased substantially from 46% to 76% in the pre-implementation period and from 77% to 82% during the implementation phase (Figure 3B). Further, as seen in the figure, there is a higher number of individuals with a VL test per reporting quarter in the implementation period compared to the pre-implementation period.

Results from the ITS analysis showed a significant pre-implementation slope, a non-significant change-in-level and a non-

significant change-in-slope. This indicates that the rate of change in VL suppression was similar in the pre- and the implementation period. Despite this, at the end of the implementation period, the estimated proportion VL suppressed was 82.8% [95% CI: 82.0, 83.5] with a difference of -1.7 percentage points [95% CI: -12.2, 8.8] between the estimated and the counterfactual values.

As temporal changes in the proportion of adolescents on the NNRTI-based regimen was observed, the trends in VL suppression across ARV class was analyzed (Figure 4). For this analysis, NNRTI- and INSTI-based regimens were grouped together, given that many individuals transitioned to these regimens from 2019 onwards. From the ITS model, the estimated proportion VL suppressed at the end of the observation period was 90.2% [95% CI: 89.6, 90.8] for those on NNRTI- or INSTI-based regimens and 75.0% [95% CI: 72.8, 77.1] amongst those on PI- or PI+INSTI-based regimens.

### VL Re-suppression

The proportion of adolescents with VL re-suppression more than doubled in the pre-implementation period from 17% to 49%, then increased steadily from 37% to 76% during the implementation period (Figure 3C).

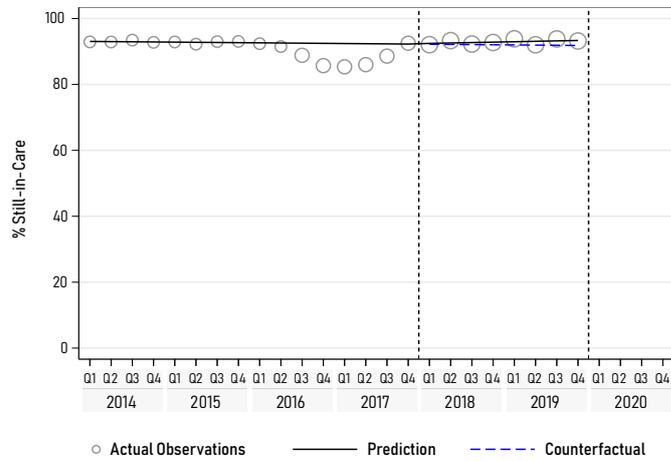
The ITS analysis indicated a significant pre-implementation slope, a non-significant change-in-level, and a non-significant change-in-slope resulting in an estimated value of 60.1% [95% CI: 67.7%, 72.5%] at the end of the observation period and a difference of -3.1 percentage points [95% CI: -20.5, 14.2, p-value=0.71] between estimated and counterfactual value.

The estimated proportion VL re-suppressed across ARV class was 49.3% [95% CI:34.6, 64.1] among individuals on NNRTI- or INSTI- based regimen and 70.9% [95% CI: 58.2, 83.5] among individuals on PI or PI+INSTI based regimen, representing second or third lines (Figure 5).

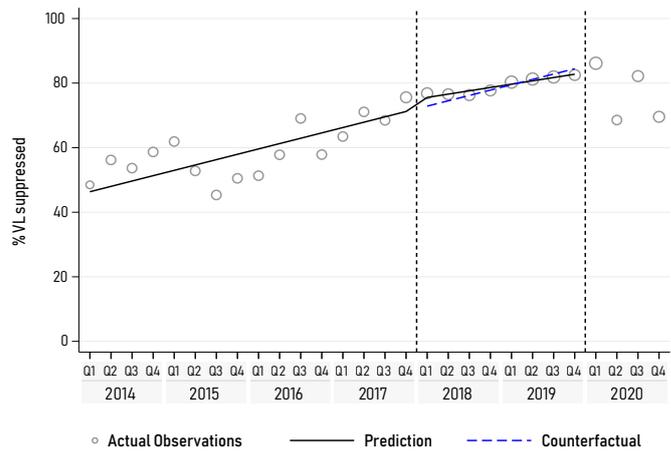


Figure 3: Results from the ITS analysis of the proportion of individuals A) still-in-care, B) with VL suppression and C) with VL re-suppression.

A) Proportion of clients still-in-care. The circle sizes indicate the number of individuals seen per quarter (denominator); small circles represent 1045-1448 individuals and medium to large circles represent 1560-2163 individuals



B) Proportion of clients with VL suppression. The circle sizes indicate the number of individuals seen and with a VL test in the reporting quarter (denominator); small circles represent 66-384 individuals and medium to large circles represent 506 to 1206 individuals.



C) Proportion of clients with VL re-suppression. The circle sizes indicate the number of individuals with a repeat VL test among those with a high VL ( $\geq 1,000$  copies/ml) in the reporting quarter (denominator); small circles represent 16-45 individuals and medium to large circles represent 53-102 individuals.

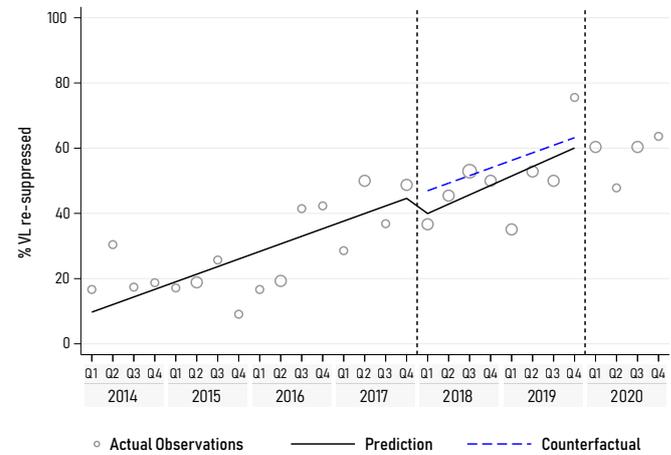


Figure 4: Results from the interrupted time series analysis of the proportion of individuals with VL suppression per ART class. Circle sizes indicate the number of individuals with a VL test in the reporting quarter. Smaller circles represent 61-187 individuals, and medium to large circles represent 236-625 individuals.

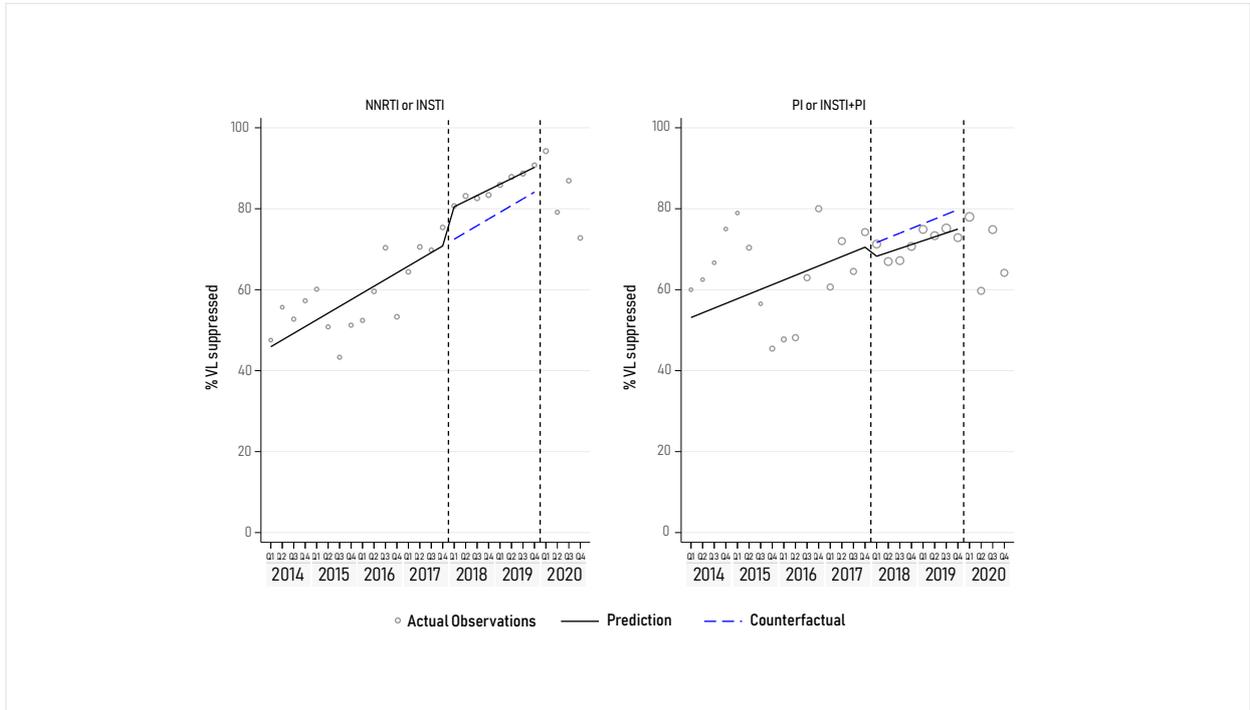
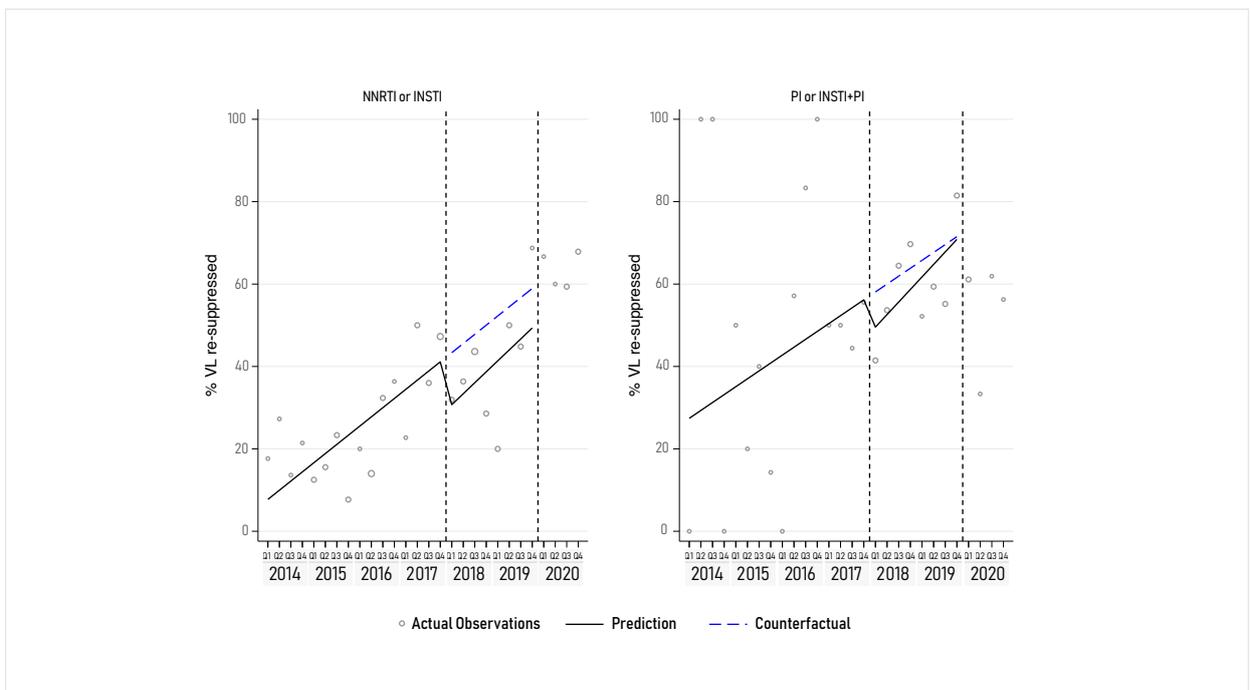


Figure 5: Results from the time series analysis of the proportion of individuals with VL re-suppression per ART class. Circle size indicates the number of individuals with a repeat VL test in the reporting quarter: small circles represent 1-23 individuals, and medium to large circles represent 25-55 individuals.



# 5. Discussion

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In the two projects implementing a model of care in teens supported by MSF between 2017 and 2020, a vast array of services and activities tailored to adolescents were developed through a one-stop, youth-friendly service and implemented in a progressive and adaptive manner, with input from teens.

These different activities were peer support, educational and counselling sessions, education on sexual reproductive health, family planning provision, mental health, and socioeconomic support, as well as time for recreational activities.

In Arua, the focus was centred on PM support, and activities ran on weekdays. In Chiradzulu, due to the size of the PHC cohorts, stable and unstable teens were seen on different days. For the stable adolescents, Saturdays were chosen due to schooling concerns and PMs' role clarified. For the unstable adolescents, weekdays specific to teens allowed more lengthy consultations and individual attention.

## 5.1 TREATMENT OUTCOMES

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Good treatment outcomes were observed across both projects. At the end of 2019, and prior to the impact of the COVID-19 lockdown, over 90% were still-in-care 12 months later, over 76% were virally suppressed, and over 60% had viral re-suppression. More frequent VL monitoring is a likely contributor to these positive outcomes, as failures were identified and acted upon early. Also, the high proportion of VL re-suppression is to be expected with the use of non-NNRTI regimens such as DTG or PIs that are less prone to resistance mutations.

The proportion still-in-care remained constantly high in both projects over the implementation periods. The proportion with VL suppression remained constant in Arua (ranging between 76% and 77%), whereas in Chiradzulu it increased from 76% to 83%. The difference between sites could be related to consecutive actions taken in Chiradzulu: 1) active VL testing of all those whose last VL result was more than six months ago and switching those failing on first-line treatment to a PI-based regimen, 2) transitioning stable adolescents from NNRTI or PI regimens to INSTI-based ones once DTG became available. In both projects, VL suppression was found to be higher among those on NNRTI-or INSTI-based regimens compared

to those on PI-based regimens. Probably because the adolescents on PIs already have a long history of failure and continue to face difficulties with adherence. This is especially true for those receiving the unfriendly Lopinavir/Ritonavir PI-based regimen (several pills, twice/day, with frequent side effects).

Similarly, over the implementation period, VL re-suppression increased from 67% to 76% in Arua and from 45% to 60% in Chiradzulu. Here, Chiradzulu lagged. This difference is likely attributable to routine access to POC-VL testing in Arua since 2013, prior to the implementation of the teen model of care. In Chiradzulu, given that POC-VL testing was implemented in a stepwise manner and only five of the ten health centres, later three, had on-site testing, access was uneven. Thus, the process of identifying treatment failures in the cohort and taking appropriate actions may have been delayed for some of the cohort.

The ITS analysis conducted with the data from Chiradzulu confirmed that the changes observed in treatment outcomes per quarter during the implementation period were similar and not significantly different to those observed in the pre-implementation period (2014 to 2017) for all three outcomes. Still-in-care remained constant and VL suppression and VL re-suppression continued to rise at the same rate during the implementation period as in the pre-implementation period. Therefore, an accelerated change in outcomes specifically related to the teen model of care was not observed.

There are several reasons why this acceleration did not happen in Chiradzulu. First, certain activities – VL testing, regimen switch – which directly impacted VL suppression and VL re-suppression were already in place before the start of the implementation period,

although at a much lower pace and coverage. Second, the cornerstone activities of the teen model of care were only steadily introduced during implementation. Systematic disclosure assessment was integrated in mid-2018 and later improved from an “on/off” to a continual process, whilst the educational curriculum started in early 2019, and peer mentorship started early but needed further adaptation. The analysis period would need to be extended beyond 2019 to see if further gains were achieved in treatment outcomes, knowing that the COVID-19 pandemic greatly disturbed the activities. Third, certain indicators (e.g. the proportion with VL suppression or VL re-suppression) had greater fluctuations. This leads to larger standard error estimates and, thus, non-significant differences in change-in-intercept or change-in-slope. However, the lack of acceleration should not be too discouraging since continuous progression in outcomes during the intervention was seen.

In Arua, we were unable to formally compare pre and post trends given insufficient data points. We did, however, observe an increase in VL coverage and VL re-suppression, whilst the proportion still-in-care and the proportion with VL suppression remained high. The high VL coverage in these projects is an indirect sign of good regular follow-up; in both contexts, there were no limitations to VL tests except when a patient was not on time for their appointment. So, a VL coverage close to 90% means that a great majority of the patients were on time on appointment to benefit from their VL test.

## 5.2 VL MONITORING AND INCREASED FREQUENCY FOR VULNERABLE PATIENTS

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The principle of having lab hubs for VL (and other tests such as CD4, TB-LAM and Crag) is clearly an asset for monitoring the patients' health. It simplifies the patient management by objectively detecting what is, most of the time, an adherence issue. In these projects, it also made allowance to double the frequency of VL measurement that the MoH was not able to assume financially and/or structurally at that time. The rate of VL re-suppression also increased substantially with the hypothesis that this is the result of detecting adolescents' adherence issues at an early stage. Having the possibilities to repeat the measure after a limited period of enhanced counselling proved efficient in reducing the delays associated with referring the samples to a regional laboratory (and possibly the associated resistances).

The following resources are, however, needed: transportation of fresh samples to the hubs (also in case of TB suspicion), time for performing the test (approximately 2 hours), waiting time for the teens, and the clinicians and counsellors being present on site prior to receiving the result so they can be acted upon, even with efforts being made to start the blood drawing process as early as possible.

## 5.3 ADOLESCENT PEERS: LOW-COST COUNSELLORS OR MUCH MORE?

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During adolescence, teens construct their identity significantly by socializing among peers and identifying with leaders. Family

remains an important support but is not enough: autonomy must be progressively gained. In the case of adolescents living with HIV, family support is often poor, stigmatization (self or external) leads to social isolation, and, in these cases, identification to leaders is difficult. During mid-adolescence teens start to progressively realize all the consequences on their future of living with HIV and have many unanswered questions.

Thus, including PMs in teen activities supports this process of identification and coping. First, PMs are also living openly with HIV and living with the same issues. Second, being older, they are leading examples to younger teens. Third, teens are more receptive to the guidance and explanations given by other adolescents than those of caregivers/adults. Therefore, it sounds more effective to choose peers to transmit key messages to this age group.

However, it must be acknowledged that peers cannot respond to the whole set of questions that individuals have, and they cannot replace a health worker but rather links have to be developed with one and the other.

The identification/selection of the teen PMs is not straightforward. They often need time to realize that they are able to accept the task. Their availability decreases when they get older, it is therefore important to continue passing on this responsibility to others.

Lastly, the concept of adolescent PMs is rather recent in adolescent care and no clear recommendations have been published. Their roles and responsibilities are yet to be defined and it should be somewhere between Arua's ambitious and Chiradzulu's more delineated model.

### Box 3: Context of Peer Mentors

In these projects, the peer mentors were all born with HIV. They were volunteers selected for their leadership skills and specially trained on HIV and group session animation. The youngest ones were 17 years old, and the oldest around 25 years old. To be older than the teens they support is key for the PMs to be credible but also to be able to see themselves as role models. However, they should not be too old because they would then appear as adults.

The financial support of the peers must be considered, and a minimum reimbursement for their time, transport, phone communication and tracing activities provided.

Finally, supportive supervision is needed, as they are not clinicians nor psychologists. They should be supported by health worker referents and have a place in the multidisciplinary team discussions.

## 5.4 AN EVOLVING TREATMENT LANDSCAPE

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Devised in response to the high prevalence of virologic failure in adolescents in Uganda and Southern Malawi, these two adolescent-friendly care packages were developed and implemented from the beginning of 2017 during a time where ALHIVs were being transitioned to dolutegravir-based regimens. Currently, almost all HIV-positive adolescents benefit from these treatment regimens globally. Finally, both Malawi and Uganda adopted the six-month VL frequency for children and young teens.

It will be crucial to decide what's next for teens failing a DTG-containing regimen, as genotyping is still mostly unavailable. Alternatives to oral drug intake (injectable long-acting drugs, and later, patches and implants) are appealing options that could deeply change issues with daily adherence and improve their quality of life.

There is an urgent need to prequalify the injectable ARVs (for prevention or treatment) for individuals < 18 years.

## 5.5 OTHER ACTIVITIES

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Apart from the optimization of medical care (bi-annual viral load, optimization of ARV regimens with or without drug resistance testing) and the indisputable contribution of peer educators in these two projects, other aspects of the model deserve to be highlighted.

1. Support for adherence must be ongoing. It is not necessary to wait for an adolescent to stop his treatment to take an interest in it. Every opportunity should be used to strengthen patients' knowledge about their disease, their treatment, and the importance of daily intake. In patients with good adherence, the delivery of an undetectable VL result should be accompanied

by encouragement, congratulations and a reminder of how ARVs work for HIV. A change in ARV regimen and treatment of an intercurrent infection should also be explained, adapting the speech to the adolescent's comprehension abilities. Finally, for older adolescents who frequently voluntarily stop treatment, it is helpful to explain that even if they have no symptoms, their infection is actively evolving, and their defences are weakening.

2. This approach of active transmission of information in medical consultation, counsellors or peer educators limits the risk of treatment abandonment and promotes re-suppression after a therapeutic stop or an episode of poor compliance.
3. For the most complex cases, these explanations are insufficient. These are patients who often live in precarious social conditions and/or are confronted with degraded or toxic psycho-educational situations. Multidisciplinary care, including psychologists and social workers, is often necessary to improve the conditions that will allow a return to good compliance. In the absence of available human resources within the team, working in partnership with government departments or other NGOs may be considered.
4. SRHR is not directly related to virological results, but the inclusion of this service in the package is based on two arguments: unwanted early pregnancies are a major factor in failure when they occur, and the entry into the romantic and sexual lives of adolescent boys and girls who are born with HIV is particularly complex. By integrating SRHR into the provision

of care, the team promotes lower-risk practices, offers ways to avoid pregnancy or STIs, and shows adolescents that they take their concerns into account. This promotes dialogue, maintenance of care and, ultimately, therapeutic success.

The interventions in Arua and Chiradzulu began at the end of 2017 in response to the high prevalence of virologic failure in adolescents. Dolutegravir, a powerful well-tolerated drug, which is easy to take and has a high genetic barrier to resistance, had already been introduced<sup>35,36</sup> and is an important step that likely partially contributed to the positive outcomes. However, evidence from the field suggests that in real-world situations, the selection of resistance mutations may be faster than what has been observed in randomized studies.



Participation to Teen Clubs can be so high that MSF teams have to split a club in two groups to ensure it remains manageable.

# 6. Conclusion

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It is hoped that the models that MSF and others developed should be helpful in reducing the number of adolescents failing on treatment for several years. Several innovative approaches have been tested and the majority of them will be useful to maintain.

The exact reproduction of these two models, one centralized in a regional hospital, the other one decentralized at health centre level, could be difficult to maintain without specific and additional financial and human resources. However, an adaptation of these models can be realized.

The various activities do not necessarily have to be initiated at the same time. The first step is to book the appointments of the adolescents on a specific day(s), which can be chosen according to the size of the active cohort, the availability of the health workers and the preference of the teens. If the active cohort is small, once a month can be enough and if the cohort is large, twice a month or once a week may be more suitable. To be efficient, group sessions should not have more than 15-20 participants of the same age range.

Once the teens are booked on the same day, it becomes possible to organize group sessions structured around a curriculum to identify adolescent leaders and encourage them to act as peers after specific training and with supervision. From this step, additional activities, such as specific SRHR consultations, may be progressively added.

There were no control groups in these projects and several reasons can explain the progression of the indicators. However, the high retention rate observed is likely to be related to the needs centred approach tailored to adolescents. The social isolation of these adolescents has been reduced, and bonds of friendship have developed, often beyond the days organized in health centres. Very few patients were definitively lost to follow-up, with most of the patients who stopped their treatment coming back for care before getting too sick.

In brief, even without many resources, the package of care for adolescents living with HIV can improve their response to treatment and quality of life.



Teenagers crowding the Namibambo Health Centre near Chiradzulu, southern Malawi, for an MSF "Saturday Teenage Club" dedicated to HIV-positive youths.

# 7. Key Recommendations

## 1. SCHEDULING

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- ▶ Schedule all adolescents on the same day, irrespective of their health or VL status, for peer interaction if the workload allows for this. Full disclosure before participating in the groups is key.
- ▶ Consider scheduling adolescents by age group for better socialization and to provide age-adapted educational sessions and services (e.g. SRHR).
- ▶ Saturdays are preferred by the teens due to schooling concerns but are not always convenient for the staff and require additional resources. If activities are planned on weekdays, scheduling the appointments during school holidays can be an option.
- ▶ For the young adolescents (~10 to 13 years), the presence of the caregiver is still important to consider in the consultations and the counselling sessions, especially before full disclosure is completed. Even after full disclosure, integrating the teens in adolescent activities does not mean excluding the parents, especially in cases of failure.

## 2. VIRAL LOAD TESTING

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- ▶ The VL testing every six months has been a cornerstone of detecting and managing rapidly individuals with sub-adherence and confirmed failure.
- ▶ A POC system allows additional VL measurement for the most at-risk and reactivity towards failure when national systems are overloaded.
- ▶ A mix of regional DBS-VL every year and additional measurements in between, either as routine for high-risk groups or to act swiftly on suspected failure, is worth trying.

### 3. DISCLOSURE

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Disclosure is a continuous process. All the staff should be sensitized to the teens' need of acquiring additional but different information as they grow. This progressive post-disclosure process is demonstrated to contribute to the child/teen's self-empowerment vis-a-vis long-term treatment.

### 4. ADOLESCENT PEERS

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- ▶ Further evidence is required on the delineation of roles of PMs and other health workers (clinicians, counsellors), taking into consideration their competencies but also their limits.
- ▶ Encourage PMs who become young adults to 1. support younger and recently trained PMs, 2. set good examples to younger adolescents, especially if they get married, have children and/or follow successful goals, and iii. spread the “undetectable = non-transmissible” message, as counsellors are still not all at ease with that concept.

### 5. POOR ADHERENCE – MULTIPLE COMPONENTS

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- ▶ Other reasons for poor adherence need to be investigated for adolescents with suspected failure. The most frequent reasons for not being able to take treatment are psychological (depression/secondary denial of illness/ refusal of treatment and rejection of care/risky behaviour/neurological delay) and/or social (poor economic conditions/lack of family support/psychological or physical abuse).
- ▶ A dedicated multidisciplinary team (composed of clinician, counsellor, PM, mental health specialist, and social worker) would therefore be a good starting point to address the individual needs of these adolescents.

## 6. MENTAL HEALTH ASSESSMENT AND CARE

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Recognizing screening and caring for adolescents with mental health issues is essential. Links with psychological services should be available when needed.

## 7. TRANSITION TO ADULTHOOD

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Although the plans for transitioning adolescents to adult care were developed, these were never implemented due to the restrictive measures taken during the COVID-19 lockdowns.

It would be pertinent to group the appointments of the young adults recently transferred on the same day to maintain friendship links.

The creation of auto-support groups could also be encouraged with the support of former PMs.



Young girls enjoy themselves at the end of an MSF Teen Club session in the Namibambo Health Centre in Chiradzulu district.

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