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Agissons pour une génération sans SIDA

Evaluation of Viral Suppression in the Context of Differentiated Service Delivery (DSD) in Côte d'Ivoire

FINAL STUDY REPORT

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Submitted by EGPAF

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Acronyms

AIDS	Acquired Immune Deficiency Syndrome
ALHIV	Adolescents Living with HIV
ART	Antiretroviral Therapy
CDC	Centers for Disease Control and prevention
CDI	Cote d'Ivoire
CIPHIA	Cote d'Ivoire Population Based Health Indicators Assessment
CNESVS	Comité National d'Ethique des Sciences de la Vie et de la Santé *(local ERC)*
DIIS	Direction de l'Informatique et de l'Information Sanitaire *(Directorate of Informatics and Health Information)*
DSD	Differentiated Service Delivery
EA	Evaluation Assistants
EDC	Electronic Data Capture
EGPAF	Elizabeth Glaser Pediatric AIDS Foundation
ERC	Ethical Review Committee
HCW	Health Care Worker
HIV	Human Immuno-Deficiency Virus
IP	Implementing Partner
LTFU	Loss to Follow Up
MMD	Multi-Month Dispensing
MSHP	Ministère de la Santé et de l'Hygiène Publique (Ministry Of Health and Public Hygiene)
ODK	Open Data Kit
OI	Opportunistic infections
PEPFAR	President's Emergency Plan for AIDS Relief
PI	Principal Investigator
PLHIV	People Living With HIV
PNLS	Programme National de Lutte contre le Sida (National AIDS Control Programme)
PMTCT	Prevention of Mother to Child Transmission (of HIV)
SOP	Standard Operating Procedures
VL	Viral Load
WHO	World Health Organization

BACKGROUND

While HIV prevalence estimates in West and Central Africa remain lower than in other regions of sub-Saharan Africa, Côte d'Ivoire has among the highest estimates of HIV prevalence at 1.8% of the adult (ages 15-49) population, 62% of whom are virally suppressed (1).

As of 2022, there were an estimated 410,000 adults living with HIV in Côte d'Ivoire (1), and in 2017, UNAIDS estimated the number of children living with HIV (CLHIV) ages 0-14 to approximately 18,000 (2). Services for people living with HIV (PLHIV) have expanded greatly in recent years; between 2014 and 2018, the number of HIV care and treatment sites in the country had more than doubled, from 768 to 2035, and are now available in all health regions and districts (3).

In February of 2017, the government of Côte d'Ivoire issued new HIV care and treatment guidelines for the adoption of the World Health Organization (WHO) 's "Treat All" recommendations of lifelong ART for all HIV-positive individuals regardless of clinical or immune status (3, 4). The aim of the adoption of these guidelines is to ensure that there is a greater access of PLHIV to ART in Côte d'Ivoire. According to the PNLS 2019 quarter one (January -March) report (11), the number of HIV positive patients on ART increased from 215,526 in March 2017 (beginning of "Test and Treat All" strategy) to 260,225 by March 2019. Due to this increased number of PLHIV on ART, there is a need to put in place appropriate strategies to minimize site congestion while ensuring patient retention in care and treatment effectiveness

As countries worldwide work towards reaching the Joint United Nations Program on HIV/AIDS (UNAIDS) 95-95-95 targets, national governments and their partners in HIV prevention, care, and treatment have sought innovative solutions to the increased burden that these ambitious targets place on healthcare infrastructures. Among these solutions is the "differentiated service delivery" (DSD) approach which is a client-centered approach that tailors HIV care and treatment services to the needs and preferences of different populations- including the need for patients with poorly controlled infection for more intensive care and follow-up, and the preference of many patients with well-controlled HIV for less burdensome care options. This approach is designed to improve both the quality of life of the client and the effectiveness of the health system.

Many types of DSD programs have been piloted or introduced in a variety of settings, with changes to where care is provided, who is able to provide various HIV care and treatment services, and how often services are accessed by target populations (3, 5, 6). Mutasa-Appolo et al. assessed the impact of reduced frequency of clinic visits and drug dispensing on patient outcomes through a systematic literature review and meta-analysis (6). They highlighted that reduction of clinical visits of stable patients who are virally suppressed, tolerate their drug regimen, and are fully adherent to ART may result in improved clinical outcomes and a reduced burden for both health systems and PLHIV.

While DSD approaches have been successfully adopted in many settings (8, 9), the vast majority of studies and programs have targeted clinical stable adult patients in high prevalence settings in Eastern and Southern Africa (10). This evaluation helped to fill the gap in information about health outcomes in a lower prevalence setting such as those seen in West Africa.

In addition, while many have argued that pediatric and adolescent patients may also benefit from this approach (10), barriers to broadening access to DSD for these groups include concerns about frequent dosing changes for the youngest ART patients as well as assumptions that issues with retention and adherence among adolescents should require more contact with the health system rather than less. This evaluation served an important role in better understanding the impact of a DSD model on key health outcomes for ART patients including children under five years and helped inform efforts in Côte d'Ivoire to increase access to ART.

This evaluation provides important information on the success of a DSD model in keeping ART patients virally suppressed. This evaluation also aimed at better characterizing the demographic and clinical profile of this sub-population of PLHIV receiving services through this model, as well as factors that may be associated with retention in DSD care and viral suppression among these stable patients.

1. Objectives

1.1. Primary Objective

The primary objective of this evaluation was to:

- To evaluate the difference in HIV viral suppression (<1,000 copies/mL) and undetectable viral load (VL) of stable children, adolescents and adults on ART from baseline to 12 months and 24 months after transitioning to the DSD model of care in selected health facilities in Côte d'Ivoire.

1.2. Secondary Objectives

The secondary objectives of this evaluation were to:

- Evaluate the proportion of participants entering DSD care who continued to receive care through a DSD model at 12 and 24 months.
- Assess the outcomes of participants who did not continue to receive care through a DSD model at 12 months and 24 months after first transitioning to the DSD model of care.
- Assess the factors associated with viral suppression and retention in DSD.
- Evaluate the proportion of patients at evaluation sites who are a.) already enrolled in DSD, b.) not enrolled but eligible for DSD, and c.) not eligible for DSD, as well as reasons for not enrolling or not being eligible.
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METHODOLOGY

1. Design

This evaluation had two components:

- The first component was the pre-screening phase conducted to review patient records and identify eligible patients, which collected patients' clinical records. This component used a retrospective cross-sectional study of patients in the active list of PLHIV.
- The second component was the screening and enrollment phase with the prospective observational cohort evaluation study of HIV-positive children, adolescents, and adults aged 1 year and older who had been on ART for at least one year, who met eligibility criteria for a DSD model of care, and had not yet transitioned to this model.

Once enrolled, trained Evaluation Assistants (EAs) interviewed participants and/or their caregivers every six months when they return for their regularly scheduled ART refills

and/or clinical care in order to collect HIV/ART-related medical information and information on services received, and to capture any changes in their care or other outcomes.

Relevant medical information was also abstracted from facility records at six-month intervals during the evaluation period, including results from laboratory testing run as a part of regular care (including viral load). Participants were followed up for a total of 24 months. The evaluation did not include any evaluation-specific provision of clinical care or collection of biospecimens, and EAs were not directly involved in any decisions about participants' health care.

2. Population

This evaluation included HIV-positive males and females, children, adolescents and adults aged 1 year and above who were enrolled on ART at CDC- supported sites and have been identified as stable by their health care providers. Adolescents ages 10-17 were interviewed alongside a parent or caregiver, and for children age 9 and younger only parents or caregivers were interviewed. The estimated minimum sample size for this evaluation was 155 participants.

3. Study setting

The proposed evaluation was implemented at sites supported by the six CDC clinical IPs (ACONDA VS, Ariel Foundation, EGPAF Djasso, HAI, ICAP and SEV-CI). The evaluation prioritized high impact health facilities with higher volume of patients on ART both to facilitate timely accrual to the evaluation and because these are facilities that benefited most from a model of care that helps to reduce the number of visits for stable patients. Most facilities were government hospitals or clinics, while the remaining facilities were run by faith-based organizations or non-governmental organizations. All were located in urban settings with large catchment areas. The 60 sites listed represent at least one site from each CDC-supported region and IP. The patients receiving services at these sites comprise 65% (94782/145536) of the total number of HIV patients currently on ART at facilities supported by CDC in Côte d'Ivoire by June 30, 2019. Twenty-nine sites were selected to participate in the evaluation.

4. Data collection

After obtaining approval from the ethics committees (Advarra and CNESVS) on February 12th, 2020, 29 EAs were trained in the various study components. Data collection began on March 1, 2020, at the 29 evaluation sites, with the participant pre-selection and enrolment phase ending on January 31, 2021. The participant follow-up phase took place every 6 months from enrolment and ended at the same time as data collection on August 31, 2022. Data collection was carried out electronically on a tablet using the "ODK-X" platform.

5. Data analysis

Data from the pre-screening checklist and the screening checklist was used to describe the population of ART patients receiving care for HIV at the evaluation facilities in order to better contextualize the evaluation population and findings. In addition, the cohort data provided data on patient retention in the MMD care model and the associated viral load results. Descriptive analyses (frequency, proportion) were used to get results.

6. Ethical Considerations

The protocol was approved by National Ethics Committee for Life and Health Sciences (CNESVS) in CDI, Advarra Ethics Committee in Washington, DC and the Centers for Disease Control and Prevention Associate Director for Science (ADS) in Atlanta, GA. Written informed consent was obtained from each participant before undertaking any study-specific activities.

RESULTS

1. Implementation of the study

Each step of the implementation process contributed to the success of this project. The different steps of implementation were (figure 1):

- Protocol writing
- Recruitment and Staffing
- Development of SOPs
- Staff training
- Data collection
- Data analysis and reporting

- Diffusion of results to the Ministry of Health and then to the National Aids Control Program
- Scientific dissemination (Abstract for IAS Conference 2023 and Adherence conference; current manuscript writing)

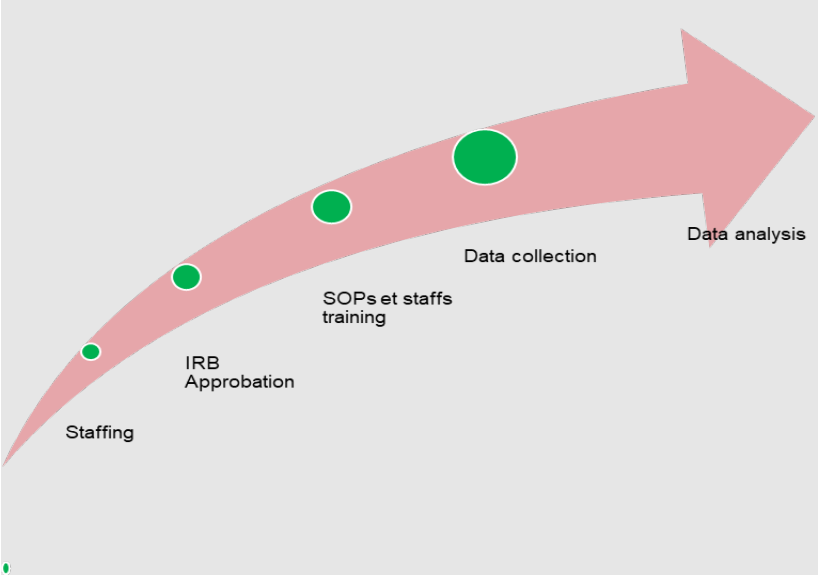
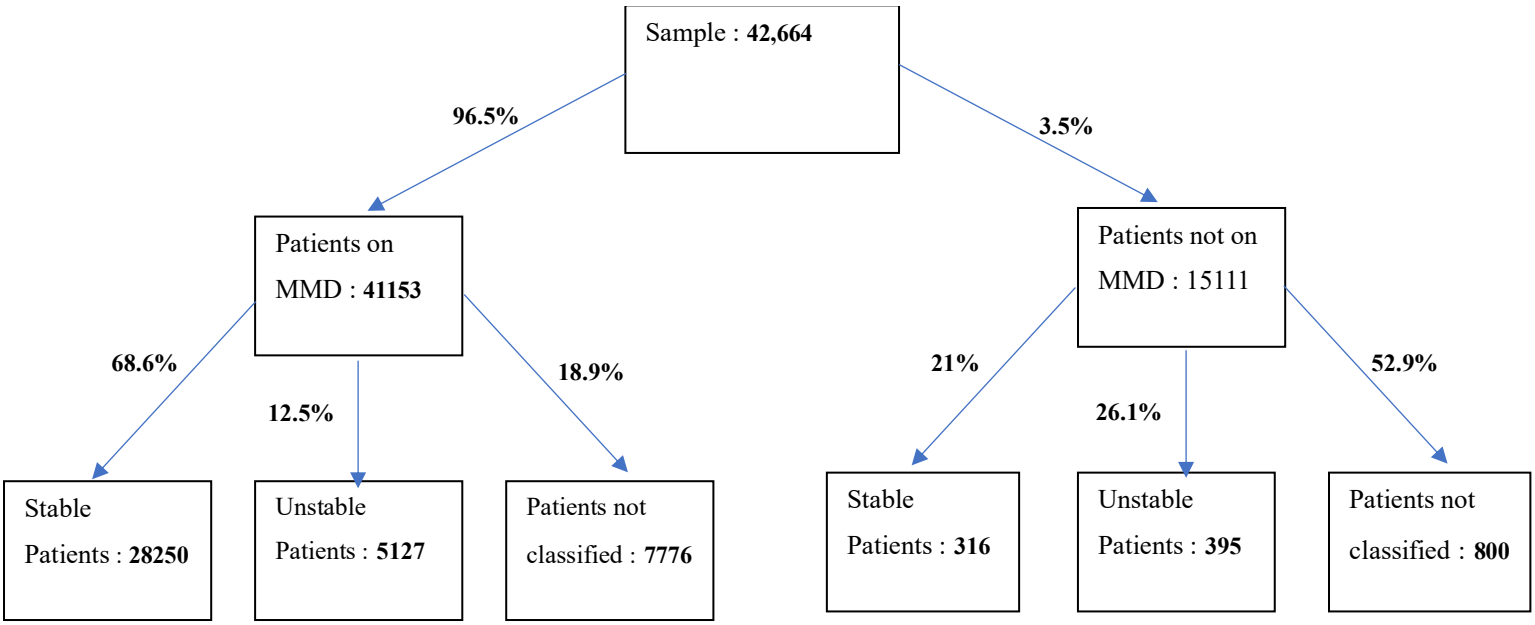


Figure 1 : Steps of implementation

2. Results of the pre-screening phase

As part of the pre-screening of study participants, 42,664 patients' clinical records were considered. The majority of those patients (90%) were on MMD during pre-screening. However, of those on MMD, just over two-thirds (68.6%) were eligible for this model. Furthermore, among patients not on MMD, less than a third (26.1%) were eligible for this model.

Figure 2 : Results of pre-screening



The majority of patients had at least one VL result, among whom 85% within 12 months. Sixty-three percent (63%) of children under the age of 15 had a VL result within 6 months, compared to <50% of those aged 15 and plus. Children under 15 were more likely to have a VL result within 6 months (63%, compared <50% of those 15 and older). Viral suppression was correlated to age: 29% of children and 29% of adolescents were not virally suppressed, compared to 15% of adults 20-34 and 9% of adults aged 35 and older. Regarding pregnant and nursing women, 13% had an unsuppressed last VL. Male children were significantly more likely to have an unsuppressed VL but sex was not associated with VL for older ages. Among adults, increased time on ART was also associated with lower odds of unsuppressed VL.

3. Results of the prospective cohort

3.1. Socio-demographic characteristics of participants

A total of 711 patients were enrolled in the study. Most participants were females (69%), mainly in the 35 - 44 age group (35.9%). Almost half of the adult participants were married/in couple (46%) and had biological children (83%). Most participants' highest level of education was secondary school (n=213; 30.2%). The majority of patients had shared their status with people other than their caregivers (68%). The duration of antiretroviral treatment at the start of MMD was most frequently observed to be less than 6 months (33%).

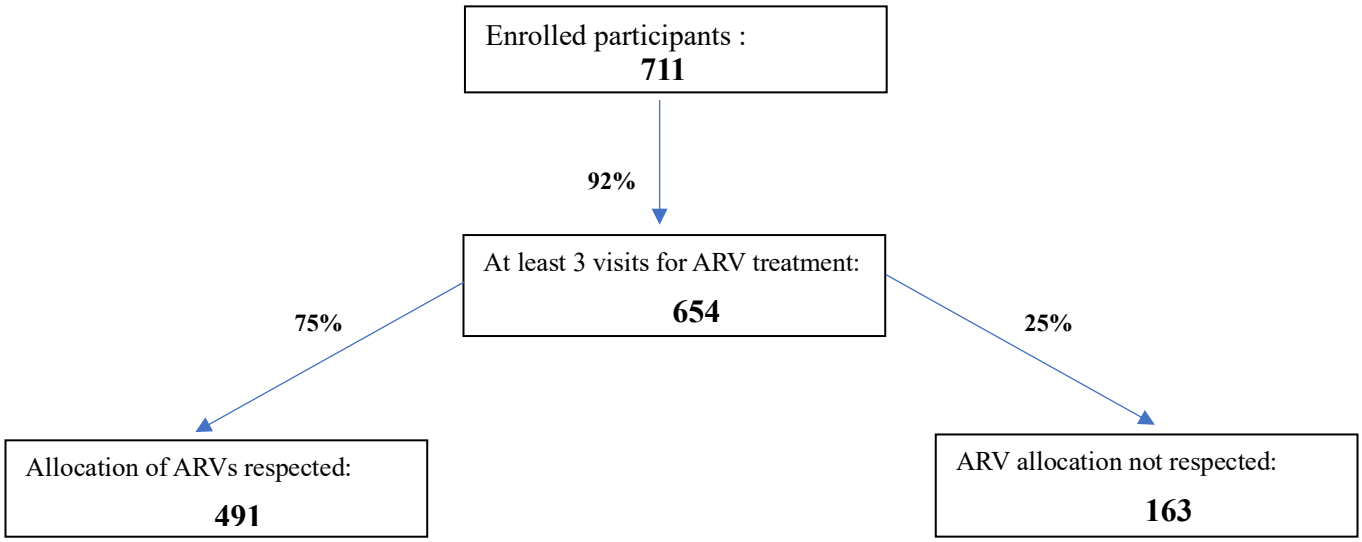
Table 1: Characteristics of participants

Characteristics	N (%)
Age (year)	
<5	17 (2,4)
5-9	19 (2,7)
10-14	5 (0,7)
15-17	11 (1,5)
18-24	39 (5,5)
25-34	142 (20)
35-44	255 (35,9)
45-54	146 (20,5)
55+	77 (10,8)
Sex	
Male	223 (31)
Female	488 (69)
School patient	
Yes	69 (10)
No	642 (90)
Marital status	
Married/coupled	306 (46)
Single	262 (40)
Divorced/Widowed	91 (14)
With biological children	
Yes	544 (83)
No	115 (17)
With dependent children	
Yes	395 (60)
No	264 (40)
Household members on ART	
Yes	41 (6)
No	11 (2)
Highest level of education completed	
Maternal	5 (0,7)
None	201 (28,5)
Primary	211 (29,9)
Secondary	213 (30,2)
Tertiary	64 (9,1)
Autre	11 (1,6)
Shared status with people other than care providers	
Yes	480 (68)
No	231 (32)
Duration of antiretroviral treatment at onset of MMD (months)	
<6	235 (33)
[6;12[	163 (23)
[12;24[	136 (19)
24+	177 (25)

3.2. Retention of adults in the MMD model

Out of the 711 patients, 654 (92%) had at least one ARV renewal visit (92%), and of these, 75% were still on MMD. The reasons given for stopping MMD were: provider's decision, high viral load, adherence problems and stock-outs.

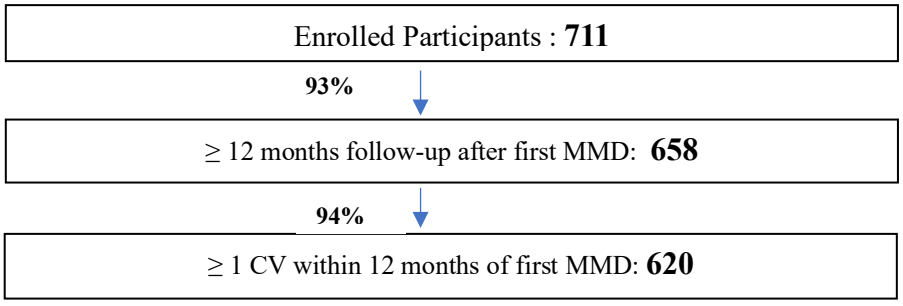
Figure 3: Retention of participants in MMD model



3.3. Viral load coverage

The majority of participants completed ARV renewal visits over 12 months after their first MMD (93%). Almost all those who made these visits had at least one viral load over this same period (94%).

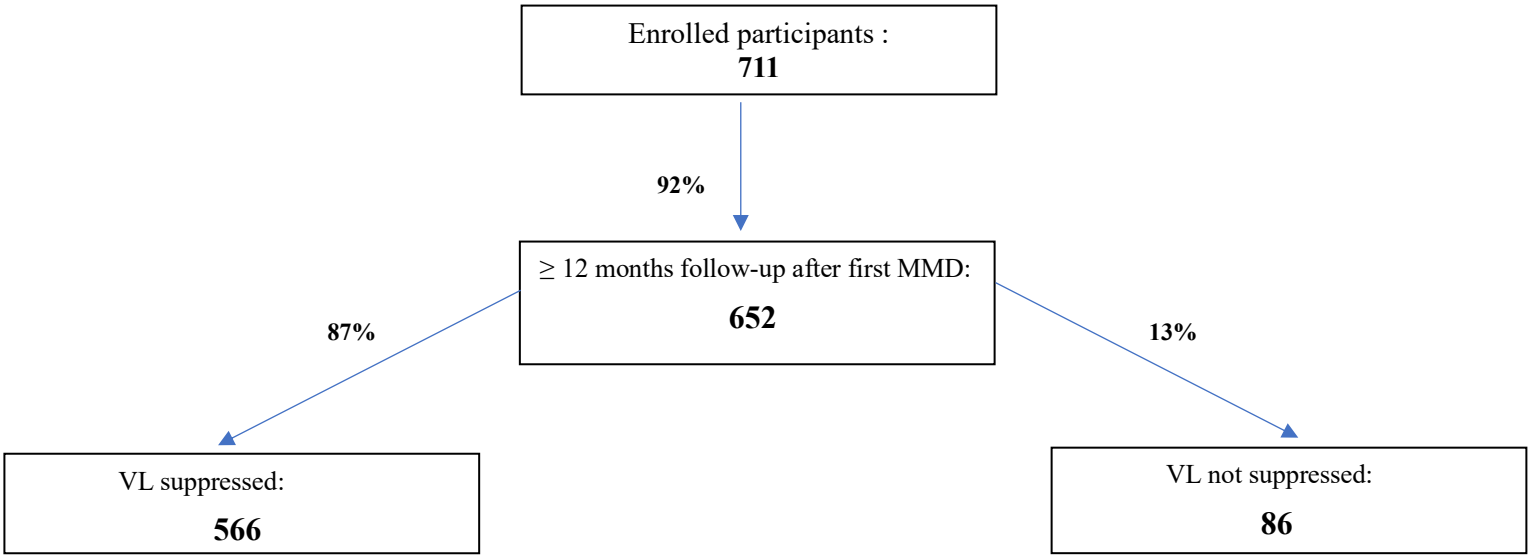
Figure 4: Viral load coverage in participants



3.4. Viral load results

Almost all participants had a viral load at least 6 months after their first MMD (92%). The majority of them had their viral load(s) suppressed (87%).

Figure 4: Viral load suppression in participants



3.5. Disclosure of HIV Status Among adults Partners

Almost all married people, 303 out of 306 (99%), gave information about disclosing their HIV status with their partner: 59% of women and 71% of men had disclosed their HIV status to their partner at the time of enrolment.

Being male, having a biological child, and serving as a caregiver to a non-biological child were associated with disclosure to partners in bivariate models, but only male sex remained significant in a multivariate model (p=0.005).

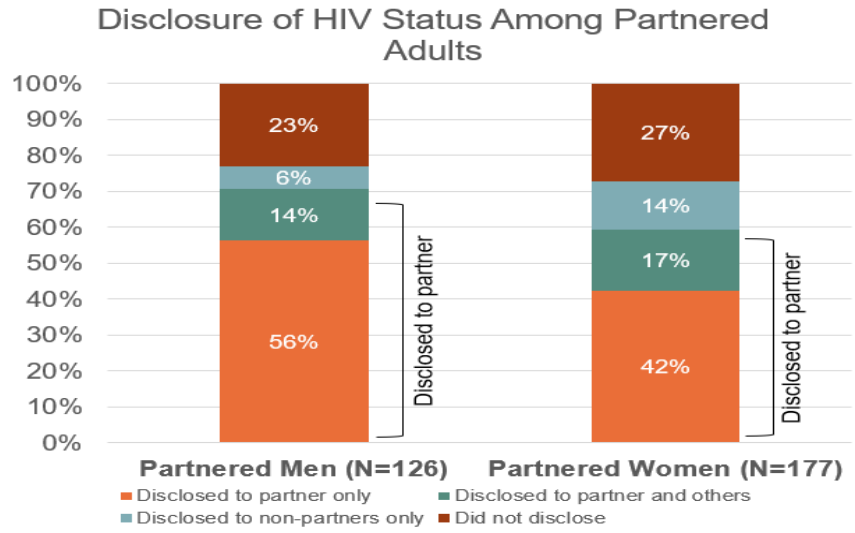


Figure 6: Disclosure of HIV status among adults married or in coupe

3.6. Results for children and adolescents enrolled in the study

3.6.1 Characteristics of children and adolescents enrolled in the study

In terms of characteristics at the time of enrolment, most children and adolescents were between 5 and 9 years old (36%), and the majority were males (54%). More than two-thirds were in school (66%), and almost half had primary school education (43%). In addition, the majority of patients had at least one household member on antiretroviral treatment (79%). For more than half of these patients, their HIV status had been shared with people other than healthcare providers (58%). Moreover, most of them had been on ART for more than 24 months (46%).

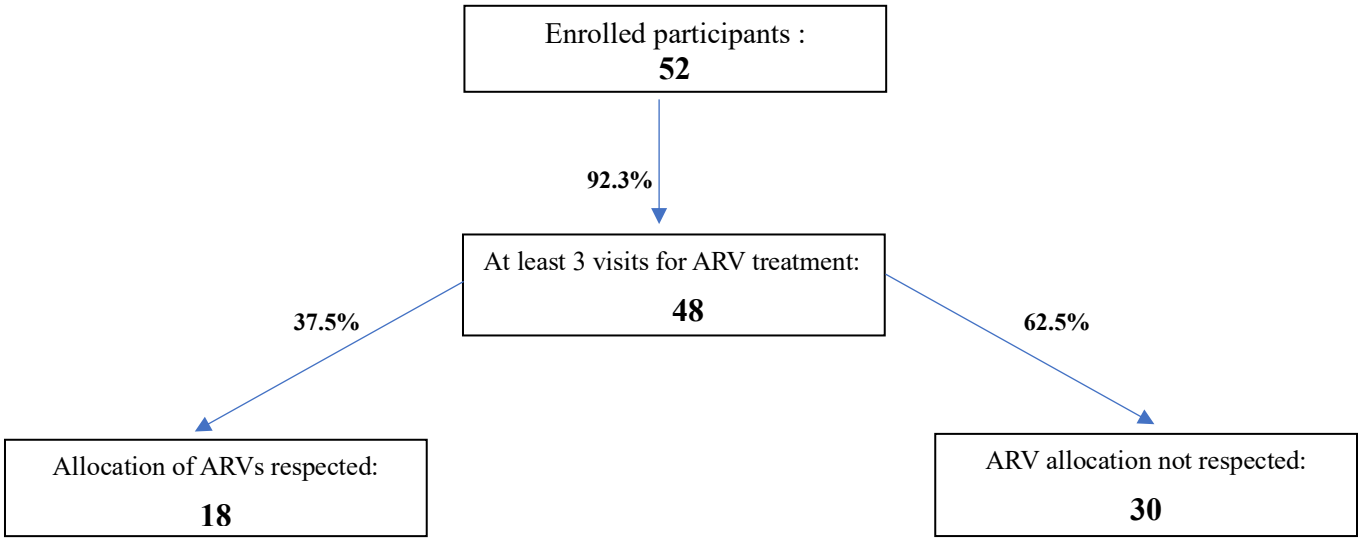
Table 2:Characteristics of children and adolescents enrolled

Characteristics	N (%)
Age (year)	
<5	17(33)
5-9	19(36)
10-14	5(10)
15-17	11(21)
Sex	
Male	28(54)
Female	24(46)
School patient	
Yes	35(67)
No	17(33)
Highest level of education completed	
Maternal	5(11)
Primary	20(43)
Secondary	13(28)
None	8(17)
NA (Age<=2 year)	6
Participants with at least one household member on ARVs	
Yes	41(79)
No	11(21)
Shared status with people other than care providers	
Yes	30(58)
No	22(42)
Duration of antiretroviral treatment at onset of MMD (months)	
<6	0(0)
[6;12[	10(19)
[12;24[	18(35)
24+	24(46)

3.6.2 Retention of children and adolescents the MMD model

Of the 52 children and adolescents enrolled in the study, the majority completed at least one ARV renewal visit (92.3%), and of these, MMD was retained in just over a third (37.5%). The reasons given for discontinuing MMD were the provider's decision, high viral load, compliance problems and stock-outs.

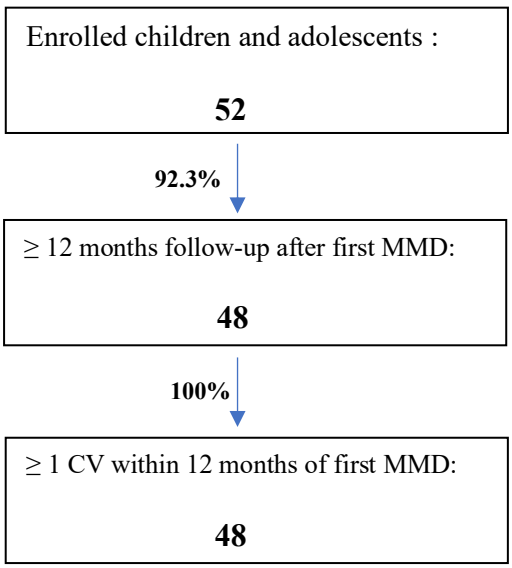
Figure 5: Retention of children and adolescents in MMD model



3.6.3 Viral load coverage among children and adolescents

The majority of children and adolescents enrolled in the study had completed ARV renewal visits within 12 months of their first MMD (92.3%). All those who had completed these visits had at least one viral load over the same period.

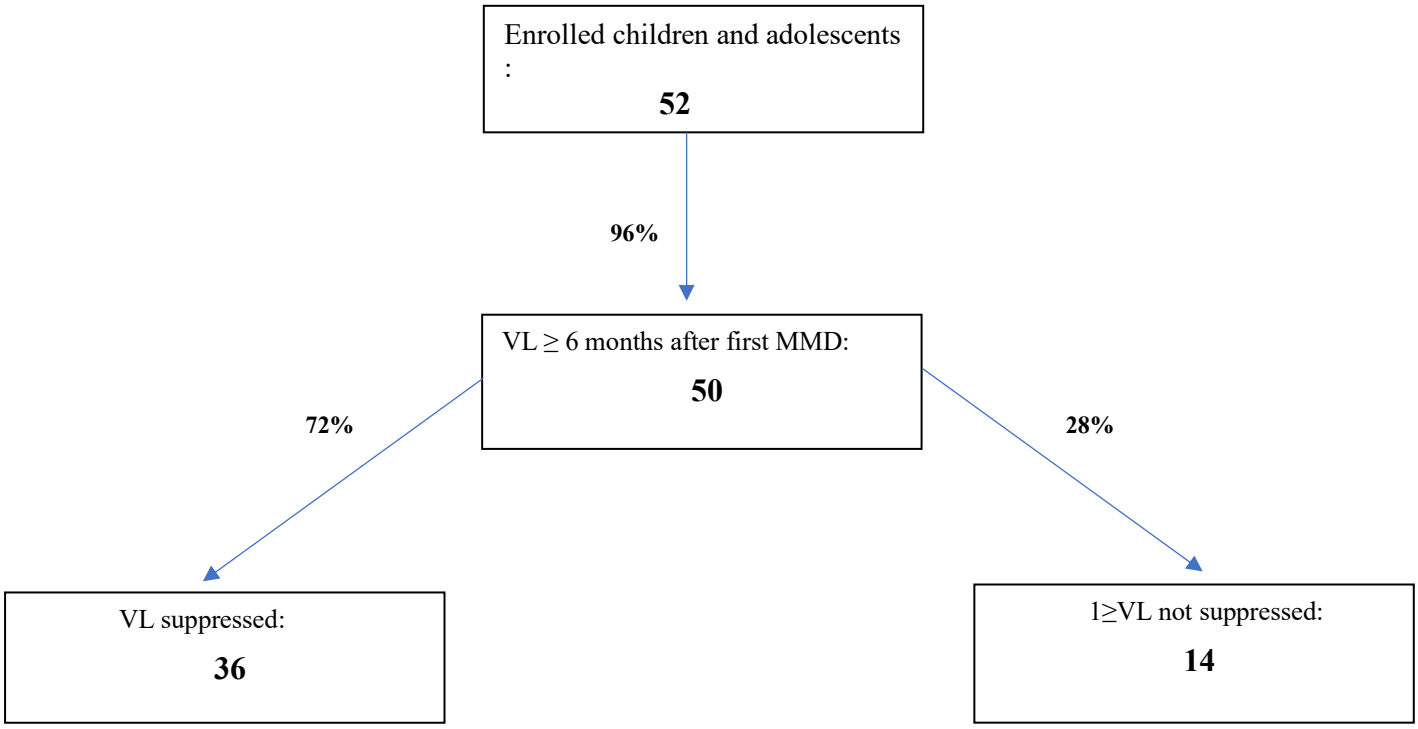
Figure 6: Viral load coverage in enrolled children and adolescents



3.6.4 Viral load results

Almost all enrolled adolescents and children had a viral load of at least 6 after their first MMD. Over two-thirds of the latter had their viral load(s) suppressed.

Figure 7: Viral load suppressed in enrolled children and adolescents



LESSONS LEARNED

1. Impact de l'étude

After the dissemination of the study to the DGS and PNLS, the decision was made to revise the national guidelines so that the follow-up of patients on MMD includes 2 sessions of contact with the patient by phone call and a home visit. In addition, we have been able to set up collaboration between health care providers and community counsellors in the viral load calendar to actively follow up with patients (there is now a viral load unit at all sites) and this has really helped to improve viral load coverage at the sites, especially among children, pregnant and lactating women. The contribution of the EAs on the sites has made it possible to improve the quality of data and care on the sites (reminders of follow-up appointments to community counselors and health

care providers for better follow-up of patients by providers, respect of clinical appointments by patients, better completeness of tools and patients' files, etc.)

2. Recommendations

- **To the Ministry of Health**

- Disseminate the new guidelines and ensure that these guidelines are adhered to at the level of health care providers through regular supervision

- **To implementing partners**

- The results of the study showed the influence of non-disclosure of HIV status on viral suppression and replication and therefore Implementing partners should set up a system to support HIV status' disclosure between spouses for better adherence to treatment.

- **To the sites**

- Synchronize patients' clinical and biological appointments in order to optimize the service delivery
- Ensure better management of ARV stocks to avoid drug stock-outs that are detrimental to the quality of care
- Addressing ARV stock-outs issues at sites

3. Limitations of study

- The COVID-19 situation has changed the eligibility criteria for study participants at the selected sites. Due to the COVID-19 pandemic, some patients that were not stable were put on MMD.
- Limited number of study sites compared to the total number of CDI sites
- This evaluation was completed only in urban sites and therefore limited scale-up possibilities
- Most adolescents came alone to the site to collect their prescriptions. Some adolescents over the age of 10 who came accompanied by their parents/guardians were often not informed of their status. As a result, several adolescents were not enrolled in the study.

- We did not collect all the patients' visits when they came to take ARVs at the sites, but only captured the allocations every 6 months (the actual proportion of patients who received MMD at each visit is certainly low).

CONCLUSION

The findings of this study have shown that MMD is well implemented in Cote d'Ivoire. However, patients receiving MMD are not continuously and correctly taking their ARV medication resulting in viral replication among them. Therefore, the implementation of a strong community active follow-up of patient on MMD is necessary to guaranty continuity of treatment and good health outcomes.

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Appendix: List of sites for DSD Evaluation

Abidjan	Inland
AGEFOSYN*	CHR de Divo
CEPREF*	CHR de Daloa
HG d'Abobo-Nord*	HM Dabou
FSUCOM de Port-Bouet 2*	CHR d'Agboville
FSUCOM de Toits-Rouges*	CSAS de Bouaké
HG de Marcory	RSB Yamoussoukro*
HG de Koumassi*	CMS Walle Yamoussoukro*
FSUCOM d'Abobo Avocatier*	CHR de San-Pedro
FSUCOM d'Anonkoua-Kouté*	CHR de Korhogo
CMS Enfant Jésus Koumassi*	CHR de Gagnoa
HG de Port-Bouet*	CHR de Yamoussoukro*
Hope de Treichville	CHR d'Abengourou
HG de Bingerville	
CS El Rapha*	
HG d'Anyama*	
CSUCom de Gonzagueville*	

* *Sites supported by EGPAF*