Photo: Eric Bond/EGPAF, 2016

GLOBAL COOPERATIVE AGREEMENT FOR TECHNICAL ASSISTANCE SERVICES (PROJECT DELTA)

ASSIGNMENT 028: REPLICATING THE ECHO MODEL FOR HIV/AIDS MENTORSHIP IN CÔTE D'IVOIRE

FINAL EVALUATION REPORT
SEPTEMBER 2019

Elizabeth Glaser Pediatric AIDS Foundation

EXECUTIVE SUMMARY

Introduction

Tremendous strides have been made in the fight against HIV and AIDS in Côte d'Ivoire (CDI).[1] The prevalence of HIV among adults aged 15–64 years in Côte d'Ivoire is 2.9% and 4.1% among females and 1.7% among males. This corresponds to approximately 390,000 people living with HIV (PLHIV) aged 15–64 years in Côte d'Ivoire. In addition, 49, 8% of PLHIV aged 15–64 years report knowing their HIV status, 92% self-report current use of ART, with 73.7% of them virally suppressed[2]. The government of Côte d'Ivoire, through the Ministry of Health, has scaled up HIV prevention, care and treatment activities at all health regions and districts.

However, continued scale-up of HIV services requires opening up new sites for ART provision at lower levels of the health system or expanding the capacity of clinicians who may be non-physicians with little or no experience in HIV treatment. For these health care workers, clinical mentorship is an essential form of building competencies, reinforcing skills, and ensuring that they have the knowledge and confidence to deliver high-quality ART services.[3]

The Extension for Community Healthcare Outcomes (ECHO) model was developed by the University of New Mexico (UNM), and aims to strengthen capacity for health care providers to treat complex and chronic health conditions in underserved communities by linking less-experienced providers with subject matter experts. Providers engage in weekly meetings via video and teleconference (TeleECHO sessions), during which they listen to a short didactic session, share challenging cases, and ask questions about and discuss best practices. The objective of this project was to develop and demonstrate an effective telehealth clinical mentorship model of HIV care and treatment in a resource-constrained setting. This evaluation report depicts the experiences and lessons learned from the six-month pilot of the TeleECHO Clinical Training and Mentorship Model that ran between August 2018 and March 2019 in Côte d'Ivoire for providers of adult and pediatric HIV prevention, care, and treatment services. The aim of the evaluation was to determine if the ECHO model improved the knowledge and skills of health care providers and teams to provide high-quality HIV care and treatment services in Côte d'Ivoire, and if the model should be expanded from a pilot to a nationwide program.

Methods

This was a pre- and post-evaluation using quantitative and qualitative methods of a six-month pilot of the TeleECHO Distance Learning Model in Côte d'Ivoire. A quantitative questionnaire was administered among 62 health care providers in five study facility sites to assess changes in knowledge of clinical HIV case management; perceived behavioral capability in performing clinical HIV case management; quality improvement activities; and professional satisfaction. A focus group discussion was conducted at the completion of the TeleECHO sessions to identify key themes related to experiences of participation in the ECHO program. Individual interviews were conducted with seven mentors, facilitators, and clinic

[1] President's Emergency Plan for AIDS Relief, Côte d'Ivoire Country Operational Plan (COP) 2016, April 2016.
[2] Côte d'Ivoire population based HIV impact assessment CIPHIA 2017-2018
[3] Task shifting: Global Recommendations and Guidelines. WHO. WHO Press, Geneva, Switzerland. 2008.

administrators from hub-and-spoke sites to assess the feasibility of implementing the ECHO Model in Côte d'Ivoire.

Informed consent for study participation was obtained and documented using written informed consent. The protocol was reviewed and approved by the National Research Ethics Committee in Côte d'Ivoire and the Advarra IRB in the US.

Findings

The findings showed that a majority of participants were nurses (30.7%), followed by physicians (25.8%), social workers (12.9%), and midwives (3.2%). Before the start of the pilot of the ECHO initiative in Côte d'Ivoire, only 73.4% of participants reported having access to an HIV expert in their respective regions. After the completion of TeleECHO, 80% of providers said they had access to an HIV expert and 85% said they had an opportunity to share clinical cases with their colleagues, versus 80% during the pre-test.

The overall assessment of health care workers' perceived behavioral capability in the management of HIV cases showed a statistically significant improvement in the average score, from 61.2 during the pre-test to 66.7 ($p<0.01$) after the last ECHO session was completed. At all the sites except the Yamoussoukro Regional Hospital Center (RHC), the post-test scores were better than those of the pre-test, and the differences were all statistically significant. At the provider level, scores were higher after participating in the ECHO sessions, compared to pre-test scores, except among pharmacists, social workers, and administrative staff.

In addition, the overall professional satisfaction scores of providers increased from 67.2% for the pre-test to 79.3% at the post-test. The evaluation of providers' knowledge in HIV case management increased from an average score of 48.6% to 75.1% ($p<0.01$).

Finally, the results of the qualitative study (focus group discussions and in-depth individual interviews) show that most providers and mentors were satisfied with the ECHO initiative. Participants benefited from clinical case discussions and expert recommendations in terms of gaining new knowledge. Participants said they were able to immediately incorporate this new knowledge into day-to-day care practices for the well-being of people living with HIV. In addition, due to the success of the ECHO project, some providers suggested the extension of ECHO sessions to other domains of medical practice in areas beyond HIV, such as infectious disease, gynecology, surgery, dental surgery, maternal and child health, and chronic disease care.

Conclusion

The ECHO project was unanimously accepted by health care providers participating in the pilot. Based on the evaluation results, the ECHO project enabled health care providers to significantly improve their knowledge in HIV case management, job satisfaction, and perceived capability to perform quality improvement activities to increase effectiveness of HIV care services. While the project was feasible to implement in all pilot sites, participants missed some sessions due to Internet instability and challenges related to using new technology. Expanded involvement of site directors and TeleECHO project staff could alleviate some of these concerns, as well as improve provider participation and reduce overlapping sessions with patient care activities.

COLLABORATING INSTITUTIONS

Ministry of Health and Public Hygiene Cote d'Ivoire (MSHP), Centers for Disease Control Côte d'Ivoire (CDC Mission), United States Centers for Disease Control and Prevention (CDC), Elizabeth Glaser Pediatric AIDS Foundation (EGPAF)

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LIST OF ACRONYMS

CDI	Côte d'Ivoire
AIDS	acquired immunodeficiency syndrome
ARIEL	Fondation Ariel Glaser
ART	antiretroviral therapy
CDC	U.S. Centers for Disease Control and Prevention
CFA	Currency for French-speaking Western African Countries
CGH	Center for Global Health
CNDTIC	National Coordination for ICT Development for Health
DGHA	Division of Global HIV and AIDS
ECHO	Extension for Community Healthcare Outcomes
EGPAF	The Elizabeth Glaser Pediatric AIDS Foundation
FGDs	focus group discussions
FWA	Federal Wise Assurance
GH	general hospital
HBV	hepatitis B virus
HCTB	HIV Care and Treatment Branch
HCV	hepatitis C virus
HCWs	health care workers
HIV	human immunodeficiency virus
HIV/HBV	co-infection human immunodeficiency virus and hepatitis B virus
ICT	information and communication technology
IDIs	in-depth interviews
INSP	National Institute of Public Health
IRB	Internal Review Board
IRIS	immune reconstitution inflammatory syndrome
MOH	Ministry of Health
MSHP	Ministry of Health and Public Hygiene
NGO	Non-governmental organization
OIs	opportunistic infections
PEPFAR	U.S. President's Emergency Plan for AIDS Relief
PLHIV	people living with HIV
PMTCT	prevention of mother-to-child HIV transmission
PNLS	National AIDS Control Program
PNPEC	National Care and Treatment Program
QI	quality improvement
RHC	regional hospital center
SMEs	subject matter experts
SMS	short messages system
SVR	sustained virologic response
TB	tuberculosis
TB/HIV	co-infection human immunodeficiency virus and TB
TeleECHO	Training Session During ECHO Project Implementation

UNAIDS	Joint United Nations Programme on HIV/AIDS
UNM	University of New Mexico
US	United States of America
WHO	Word Health Organization

BACKGROUND

Global ART Scale-up

Since 2014, the President's Emergency Plan for AIDS Relief (PEPFAR) has continued aggressive scale-up of adult and pediatric antiretroviral therapy (ART) across PEPFAR countries in a global effort to achieve "epidemic control."[4] Continued scale-up requires opening new sites for ART provision at lower levels of the health system, or expanding the capacity of clinicians who may be non-physicians with little or no experience in HIV treatment. For these health care workers, clinical mentorship is an essential form of building competencies, reinforcing skills, and ensuring that they have the knowledge and confidence to deliver high-quality ART services.[5]

Country Level ART Access

Côte d'Ivoire has among the highest estimates of HIV prevalence, at 2.9% of the adult (aged 15–64) population, only 40% of whom are virally suppressed. As of 2017–2018, there were an estimated 390,000 adults living with HIV in Côte d'Ivoire,[2] and in 2016 UNAIDS put the number of infection in children aged 0–14 at approximately 36,000.[4] Services for people living with HIV (PLHIV) have expanded greatly in recent years; between 2014 and mid-2018, the number of HIV care and treatment sites in the country had nearly doubled, from 768 to 1,733, and HIV services are now available in all health regions and districts.[6]

To accelerate ART coverage, the Ministry of Health and Public Hygiene (Ministère de la Santé et de l'Hygiène Publique, or MSHP) committed to implementing the WHO "test and start" treatment strategy in February 2017 for all HIV-positive individuals, regardless of clinical or immune status.[7,8] The implementation of this strategy will significantly increase the number of people living with HIV/AIDS receiving ART in Côte d'Ivoire. This will, in turn, significantly increase the workload in health care facilities, hence the need to put in place appropriate strategies to increase HIV care providers at site level, through training, and reduce site congestion while improving care and treatment effectiveness.

While these positive changes have improved access to HIV care in Cote d'Ivoire, assuring high quality HIV care and treatment service delivery at all levels of the national health system is a challenge in Côte d'Ivoire. Therefore, the Elizabeth Glaser Pediatric AIDS Foundation (EGPAF), in collaboration with the Ministry of Health in Côte d'Ivoire, through the INSP, CDC, and the University of New Mexico (UNM), implemented a six-month pilot of the TeleECHO model in six health facilities across Côte d'Ivoire. The TeleECHO model was piloted for its potential to augment ongoing efforts by the MOH in Côte d'Ivoire to strengthen capacity of health care workers to provide HIV services, and to improve the quality of care for

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[4] "An AIDS-Free Generation Delivering Sustainable Results with Accountability, Transparency, and Impact." Ambassador Deborah Birx. Global AIDS Coordinator, Department of State. Opening Plenary—PEPFAR Annual Meeting. Durban, South Africa. June 2, 2014.
[5] Task Shifting: Global Recommendations and Guidelines. WHO. WHO Press, Geneva, Switzerland. 2008.
[6] National AIDS Control Program Report, Q2 2018.
[7] Ministry of Health Quarterly HIV Program Report, Q2 2017.
[8] Arora S, Kalishman S, Thornton K, et al. Expanding Access to Hepatitis C Virus Treatment—Extension for Community Healthcare Outcomes (ECHO) Project: Disruptive Innovation in Specialty Care. *Hepatology*. 2010; 52; 3: 1124-1133.

all clients receiving HIV services. In addition, this evaluation is conducted to ensure that Project ECHO could be extended at all health facilities across the country.

ECHO Model

Project ECHO is a platform for practice-based education and training, service delivery, and outcomes evaluation developed at the UNM. The model has four components: (1) technology (multipoint videoconferencing and Internet) to leverage scarce health care resources; (2) a disease management model focused on improving outcomes by reducing variation in processes of care and sharing best practices; (3) case-based learning to establish and develop communities of practice and encourage the collaborative management of patients between providers and subject matter experts (SMEs); and (4) monitoring outcomes using an Excel database.

Project ECHO's goal is to develop local expertise by linking less-experienced providers with SMEs in a mentoring relationship through the use of videoconferencing technology, promotion of best practices, and case-based learning. Subject matter experts will receive training and regular feedback on videoconferencing techniques and group mentorship skills through TeleECHO sessions led by UNM Project ECHO staff. In weekly TeleECHO sessions that engage staff from multiple HIV care and treatment sites across the country, an interdisciplinary team of SMEs from the hub site guides local interdisciplinary teams from each spoke site through didactics, joint case review, and problem-solving.

PREVIOUS STUDIES EVALUATING ECHO MODEL

Hepatitis C Virus ECHO in New Mexico

From 2003 to 2011, UNM Project ECHO staff evaluated the effectiveness of the ECHO model in New Mexico by assessing the impact on rural clinicians participating in TeleECHO sessions on Hepatitis C virus (HCV). Impact measurements included effect on treatment rates, perceived behavioral capability, and overall professional satisfaction. First published in *Hepatology* in September 2010, this article illustrated the Project ECHO model's impact on the health care system in three major areas: (1) access to specialty health care; (2) expanded delivery of evidence-based best practice care; and (3) a new paradigm for team-based interdisciplinary professional development.[7]

Patient outcomes were also evaluated via a prospective cohort study demonstrating that clinicians engaged in and supported by the Project ECHO model can deliver treatment for HCV that is as safe and effective as an academic medical center[7] could provide. The study compared treatment of HCV at the UNM Health Sciences Center HCV Clinic to treatment by primary care clinicians at Project ECHO partner sites in rural New Mexico. The sustained virologic response (SVR) results were comparable (57.5% for specialists vs. 58.2% for primary care clinicians), and the occurrence of serious adverse events experienced by patients managed by the primary care clinicians were half the rate experienced by patients managed by specialists (6.9% of 18 patients vs. 13.7% of 20 patients, respectively).[9]

[9] Arora S, Thornton K, Murata G, et al. Outcomes of treatment for hepatitis C virus infection by primary care providers. NEJM. 2011 Jun 9; 364 (23):2199-207.

HIV ECHO in Cote d'Ivoire

In 2017–2018, a Project ECHO HIV tele-mentoring program was completed by the Côte d'Ivoire Ministry of Health and Public Hygiene through the Côte d'Ivoire National Institute of Public Health, in collaboration with the US Centers for Disease Control and Prevention (CDC) in Atlanta, and CDC Côte d'Ivoire, with technical support from EGPAF Côte d'Ivoire, and the UNM ECHO Institute.

Implementation of this ECHO tele-mentoring program was successful in a sub–Saharan setting with minimal barriers. In Namibia, Project ECHO enhanced opportunities for peer-to-peer support, and significantly improved knowledge, skills, and perceived behavioral capability of health care workers (HCWs) to manage HIV-infected individuals. Evaluation results demonstrated that the HIV tele-mentoring program was an effective means of improving access to specialty and inter-professional support.

OBJECTIVES

The aim of this evaluation is to determine if the ECHO model improves the knowledge and skills of health care providers and teams to provide high-quality care in Côte d'Ivoire, and if it should be expanded from a pilot to a nationwide program. Goals and methods of evaluation are as follows:

- **Objective 1:** To determine the feasibility and acceptability of the ECHO model in Côte d'Ivoire
  - **Evaluation Question 1:** Is the ECHO model feasible and acceptable in Côte d'Ivoire?
- **Objective 2:** To measure the impact of Project ECHO on providers' (a) knowledge; (b) perceived behavioral capability; and (c) professional satisfaction
  - **Evaluation Question 2:** What is the impact of Project ECHO on providers' (a) knowledge; (b) perceived behavioral capability; and (c) professional satisfaction?

METHODS

Study Design

The evaluation has a pre- and post-intervention design with mid-intervention and endline qualitative data collection components. This was a six-month pilot of the TeleECHO Clinical Training and Mentorship Model in Côte d'Ivoire for providers of adult and pediatric HIV prevention, care, and treatment services. Methods applied include collection of process measures to assess fidelity to the intervention; a quantitative questionnaire to assess knowledge of clinical HIV cases, perceived behavioral capability in performing clinical HIV case management, and quality improvement activities; and professional satisfaction. Focus group discussions and in-depth interviews were used to gather feedback on experiences of participation in ECHO, and feasibility of implementing this model in Côte d'Ivoire.

Study Setting

This pilot used a "hub and spoke" approach to distance learning. The sites are presented in Table 1 and the map below (Figure 1). Sites were selected based on prevalence of people living with HIV, Internet connectivity in the region, and poor access to clinical mentorship.

Table 1: HIV Care and Treatment Facilities Identified for Participation in Pilot Project ECHO

Facility	Region
Port-Bouët General Hospital	South
Daoukro General Hospital	Center–East
Abengourou Regional Hospital Center	East
Yamoussoukro Regional Hospital Center	Center
Daloa Regional Hospital Center	West
San-Pedro Regional Hospital Center	Southwest

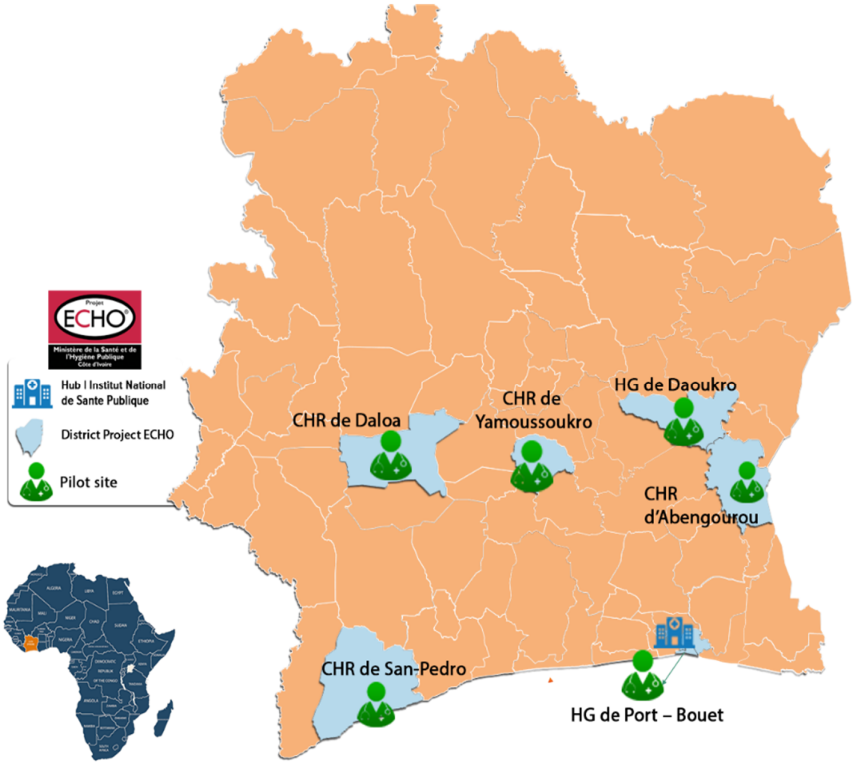

Figure 1: Pilot ECHO Project Map

Study Population

Health workers aged 18 years or older were recruited from pilot study facilities using convenience and purposive sampling methods. At each of the pilot sites, physicians, nurses, pharmacists, community counselors, and other members of the health care team were encouraged to participate in TeleECHO sessions and are referred to as "TeleECHO participants." A subset of health workers were purposively selected for focus group discussions or for in-depth interviews. Site facilitators, mentors, clinic administrators, and TeleECHO participants were recruited from all sites for a structured survey regarding the feasibility of the ECHO model in the Côte d'Ivoire context.

STUDY PROCEDURES

Process Outcomes

Key process indicators were tracked to assess project fidelity during implementation. These indicators covered the number of sessions taking place, who registered to participate versus who actually participated, who was facilitating, how many didactic sessions and patient cases were presented, and how the TeleECHO sessions were staffed. Using the Project ECHO software application, "iECHO," a web-based partner relations management tool that is used to track data for TeleECHO sessions and activities, de-identified participant data was recorded and reported in aggregate for analysis of project implementation.

A project administrator for the Côte d'Ivoire Project ECHO team routinely entered data into iECHO. During each session, the project administrator was able to view the name of each participant at each site that participated in the session. Documentation of individual participants was by a verbal or an electronic roll call during the session. Information was entered and stored in the iECHO application. The data stored in iECHO is protected with encryption. Secure user logins and passwords were required to access iECHO.

Quantitative Assessments

At enrollment before the first ECHO session began, participants went through a pre-assessment on-site with the study staff composed of people from INSP, EGPAF, and the National Coordination for ICT Development for Health (CNDTIC). The study staff explained the study to participants. If participants were willing to join the evaluation, informed consent was collected. Paper-based questionnaires were administered by the technical committee members to each study participant who provided consent. The same assessment was administered at post-intervention within six months of the last ECHO session, among those who participated at least two sessions after providing their consent. Both pre- and post-assessment interviews were conducted in French. In addition, site facilitators, mentors, and clinic administrators were interviewed using paper-based questionnaires after the last TeleECHO session was completed.

Qualitative Assessments

At the end of the implementation of the ECHO sessions, and after the last session was completed, focus groups were conducted with physicians and nurses attending at least two sessions. If participants were not available for the focus group, an in-depth interview was scheduled at a more convenient time.

Participants for focus groups and individual interviews were selected by study staff from providers who participated in TeleECHO sessions. Selection of the participants for focus group discussions included a range of providers, those who participated actively, and those who attended a few sessions only to gain a comprehensive understanding of the feasibility, acceptability, and relevance of iECHO.

Providers selected to participate in focus groups were contacted directly by study staff during the post-assessment. Study staff explained the FGDs and IDIs, discussed the content of the consent forms with potential participants, and answered any questions. Consent forms were signed by those interested in participating. Focus groups and in-depth interviews took place via video-conferencing software, and were conducted by study consultant sociologists using distance-based technology.

DATA COLLECTION METHODS

Data collectors were trained by EGPAF staff. All data collectors attended three days of training, covering the study's goals and objectives, data collection procedures, human subject protections, the informed consent process, and the use of the quantitative pre- and post-assessments.

Quantitative pre- and post- questionnaires covered HIV case management knowledge; perceived behavioral capability in performing case management and in performing QI activities; and professional satisfaction.

HIV case management knowledge assessment included 50 questions with multiple choice responses. Perceived behavioral capability was measured using a 16-item scale with seven-point Likert scaled responses, as was assessment of perceived behavioral capability to manage QI projects.

Focus group discussions and in-depth interviews with providers collected feedback on how the sessions were organized and structured into their weekly schedules. Probes into their perspectives on session usefulness; how they were able to integrate learning from TeleECHO session participation to their practices; how they selected patient cases to present in a TeleECHO session; and how they measured quality gaps in patient care, among other topics, were covered.

Individual interviews with site facilitators, mentors, and clinic administrators gathered feedback on overall feasibility of the ECHO model. Issues related to Internet connectivity and the use of iECHO technology; engagement with providers and health providers; and other practicalities of operating the TeleECHO sessions.

DATA MANAGEMENT AND MONITORING

Data were collected on paper for survey questionnaires, using distance technology for focus group discussions, via phone for individual interviews, and electronically through iECHO software for process measures.

Paper-based survey data was collected and reviewed for completeness at the time of data collection by study staff administering the questionnaires. The survey data was then entered into an electronic database designed specifically for this study. Databases had logic and range checks to ensure quality of data entry. Data were cleaned by the study coordinator and any queries were resolved prior to analysis. The pre- and post-intervention data were merged into a single database for analysis.

Focus group discussions and in-depth interviews were conducted in English, and focus groups were digitally recorded with the consent of the participants, and then transcribed. Audio and video recordings, or transcriptions, were reviewed by the study staff, after the first interviews, for quality control, appropriateness of the probes, and opportunities for exploring and clarifying emerging themes. Feedback was provided to data collectors in person before the next interviews were conducted. Interviewers prepared transcripts of the interviews they conducted. The transcripts were reviewed by the study staff for completeness and accuracy of the transcripts. Transcripts were used for analysis.

DATA ANALYSIS

Quantitative data was analyzed using Stata version 14. Descriptive statistics were used to summarize categorical (proportions, frequencies) and continuous variables (means, medians, standard deviations, interquartile ranges, and minimum and maximum values). Analysis of the knowledge assessment survey data included a subset of 25 questions randomly selected. A total score was calculated for each individual. Each correct response was assigned a value of four points, for a total possible score of 100 points for any individual. Tests of significance, using Mann-Whitney U tests, were used to determine statistically different scores pre-intervention compared to post-intervention. Only those respondents who answered all 50 knowledge questions were included in the analysis.

Perceived behavioral capability for performing HIV case management was measured using 16 items with seven-point Likert scale response categories ranging from “none or no skill” to “expert, teach others.” Responses were assigned values from one to seven, with seven being the most positive response. Statements were reverse coded, as needed, to ensure that the highest value was assigned to the most positive response. The Mann-Whitney U tests were used to determine if differences in scores pre- and post-intervention were statistically significant.

Perceived behavioral capability in performing QI activities was measured using eight items with seven-point Likert scale response categories “none or no skill at all” to “expert, teach others.” Quality improvement competency responses in the pre-test and post-test were assigned values ranging from one to seven, with higher values in the direction of the desired response. A total score was calculated for each participant, and the scores were compared pre- versus post-tests using Mann-Whitney U tests to determine if differences were statistically significant.

Professional satisfaction was measured using 12 items with five-point Likert scale response categories ranging from “strongly agree” to “strongly disagree.” Responses were assigned values from one to five, with five being the most positive response. Statements were reverse coded, as needed, to ensure the highest value was assigned to the most positive response. Tests of significance, using Mann-Whitney U tests, were used to determine if differences in scores comparing pre- and post-intervention were statistically significant.

Qualitative data analysis was conducted using deductive coding. Themes discussed in the field guides informed the coding for analysis. Coded text was summarized, identifying major themes, as well as divergent experiences and opinions. The qualitative data provided insights into feasibility of the ECHO model, and relevance and usefulness of the session content.

ETHICAL CONSIDERATIONS

All potential study participants were provided information about the purpose of the study and study objectives, and were given an opportunity to ask questions. Informed consent was gathered from all study participants before data collection.

Participants possibly benefited from the exposure to subject matter experts and the presentation of HIV cases for discussion.

Potential risks included breach of confidentiality among health care workers who may not have felt comfortable with asking questions about clinical content that they felt they should understand or know. Focus group participants did not include supervisors and their supervisees in the same group. In-depth interviews were conducted in private, and results were reported by a cadre of health care workers rather than by a facility, in order to avoid accidental identification of any individual in the study.

FINDINGS

Quantitative Surveys

PARTICIPANT SELECTIONS FOR EVALUATION

Among the 120 providers enrolled during the pre-test, 51.7% participated in at least two sessions, which was the minimum participation that was required in order to be enrolled in the post-test. Therefore, only these participants were selected for the post-test evaluation.

Inclusion for the post-test evaluation

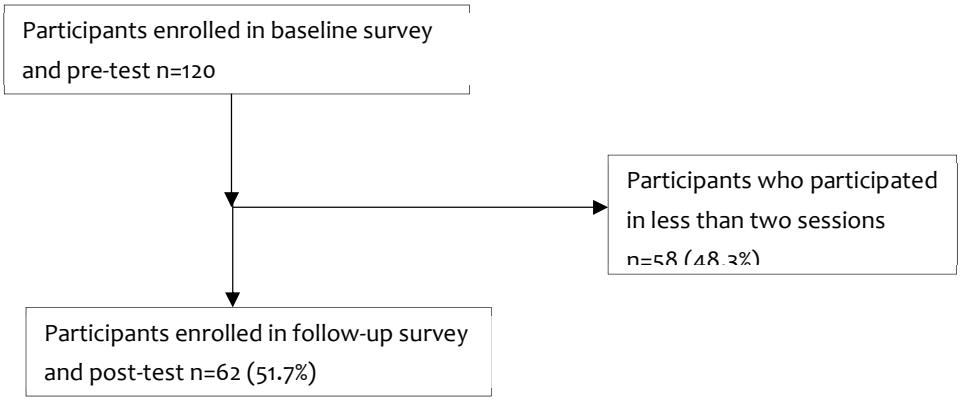

Figure 2: Retained for the post-test evaluation

Characteristics of the participants

A total of 120 health care providers from six districts within six regions participated in the pre-test evaluation, and 62 of them were qualified for the post-test evaluation. All the sites and districts for the post-test were the same as for the pre-test. Eighty-three point three percent of the sites were Regional Hospital Centers (RHCs) and two-thirds (66.1%) of the participants were from these RHCs. The most represented sites were San-Pedro RHC (19. 5%) and Yamoussoukro General Hospital (GH) (19. 5%).

Fifty-three point two percent of the health care workers who participated were male, and the average age was 41.7 years, ranging from 28–55 years. The majority of participants were nurses (30.7%), followed by medical doctors (25.8%), and social workers (12.9%). Details of the socio-demographic characteristics of the participants are presented in Table 2.

Table 2: Socio-demographic Characteristics of Participants

Characteristics	Participants (N=62) N (%)
Age (years)	Mean=41.7 (28–55)
Sex	
Male	33 (53.2)
Female	29 (46.8)
Site	
San-Pedro RHC	12 (19.4)
Yamoussoukro RHC	12 (19.4)
Port-Bouët GH	12 (19.4)
Abengourou RHC	10 (16.1)
Daoukro GH	9 (14.5)
Daloa RHC	7 (11.3)
Type of Institution	
Regional hospital center	41 (66.1)
General hospital	21 (33.9)
Type of Provider	
Nurse	19 (30.7)
Medical doctor	16 (25.8)
Social worker	8 (12.9)
Nurse's assistant	6 (9.7)
Computer scientist	4 (6.5)
Laboratory staff	3 (4.8)
Midwife	2 (3.2)
Pharmacist	2 (3.2)
Administrative staff	2 (3.2)

Providers' link with HIV care and treatment sites

Overall, all participants belonged to a site offering HIV services during the survey (100%). Furthermore, the majority of participants said they had received training in HIV care, either from continuing training (38.7%) or medical university/nursing college (29%). The remaining participants received their training from either e-learning courses, MOH HIV clinical mentors who are experienced medical doctors, or other learning sources, such as non-governmental organization and training workshops.

The average length of professional experience in HIV was 6.3 years (range 0–15 years). On average, it was reported that one health care professional was taking care of 77 HIV patients per week. The maximum number of HIV-positive patients receiving care and treatment per week in the facilities of the evaluation was 380. Table 3 presents the details of the HIV experience of the participants.

Table 3: HIV Experience of the Participants (N=62)

Characteristics	N (%)
Sites and HIV service delivery	
Yes	62 (100)
No	0 (0)
HIV Training	
Continuing training or in-company training courses	24 (38.7)
Medical university or nursing college	18 (29)
HIV clinical mentors	9 (14.5)
Training workshops	4 (6.5)
NGOs	4(6.5)
Online courses or training	3 (4.8)
Distance learning courses	1 (1.6)
Self-training	1 (1.6)
Number of years of experience in the care of HIV patients (mean, range)	mean= 6.3 (0–15)
Number of HIV-positive patients cared for by each health care worker per week at facility level (mean, range)	mean= 77 (0–380)

ATTENDANCE AT ECHO SESSIONS

There were 29 ECHO sessions held, with the average of 24 participants per session representing an average participation rate of 38.9%. Regarding topics, "Managing therapeutic failures" had the highest attendance, with 37 participants, while "Identify the factors that influence the retention of PLHIV into care (NB: Focus on the mother-to-child pair)" had the lowest attendance, with 12 participants. Details of these results are shown in Table 4.

Table 4: Attendance of Participants in TeleECHO Sessions (N=62)

Topics	N (%)
Managing therapeutic failures	37 (59.7)
Explain the "Test and Treat All" concept	32 (51.6)
Prescribe antiretroviral therapy correctly (1st, 2nd and 3rd line)	32 (51.6)
Prepare children and adolescents for ART	31 (50)
Prepare and prescribe ART for adults living with HIV	31 (50)
Evaluate the retention of PLHIV into care	29 (46.8)
PMTCT and HIV/HBV	28 (45.2)
Manage Adverse Reactions to ART	26 (41.9)
Define Treatment Literacy and adherence to ART	26 (41.9)
To identify psychological difficulties and to set up psychological support	26 (41.9)
Follow-up of TB/HIV coinfected patients	26 (41.9)
Suggest strategies to improve retention	26 (41.9)
Follow-up of HIV/HBV coinfected patients	25 (40.3)
Ensure clinical and biological follow-up to adults on ART	25 (40.3)
Treat comorbidities	25 (40.3)

Topics	N (%)
Prescribe first and second ARV regimens to children and adolescents living with HIV	24 (38.7)
Set out the basic principles for a transition from adolescence to adulthood for PLHIV in ART, and set out the basic rules for reporting HIV status to children and adolescents (when and how)	24 (38.7)
Evaluate Adherence to ART and suggest strategies to improve adherence to ART	24 (38.7)
Active TB screening to PLHIV	21 (33.9)
Perform quality screening for effective treatment	21 (33.9)
Screening for HBV to PLHIV	21 (33.9)
Treat HIV/HBV coinfection	20 (32.3)
Inform data collection tools	19 (30.7)
Clinical and biological follow-up to adolescents under ART (failure management, adverse effects)	19 (30.7)
Bring together the arguments of the diagnosis and ensure the management of IRIS, whatever the etiology	19 (30.7)
Treat tuberculosis to PLHIV	18 (29)
Identify factors that influence adherence to ART	17 (27.4)
Inform data collection tools	16 (25.8)
Identify the factors that influence the retention of PLHIV in care (NB: Focus on the mother-to-child pair)	12 (19.4)
Average Participation	**24.1 (38.9)**

FEEDBACK ON ECHO SESSIONS

Ninety percent of participants responded that TeleECHO reduced their professional isolation, and 87.1% of participants responded that TeleECHO enhanced their professional satisfaction. In addition, 82.3% of the participants agreed that the TeleECHO sessions improved the quality of care that they provide to their HIV-positive patients and enhanced their professional satisfaction.

Ninety-two percent of the participants reported that the presentations during the pilot TeleECHO sessions provided them with useful up-to-date knowledge, and 52.5% said that the HIV case-based discussions during the Project ECHO sessions were not always relevant to their clinical practice (see Appendix P List of Case Presentations).

However, according to 98.4% of the follow-up survey responders, Project ECHO was a useful tool for improving information-sharing among HIV care and treatment providers, and 90.2% agreed that Project ECHO was a useful tool for national experts to provide technical assistance in HIV care and treatment.

Most of the respondents (96.7%) indicated that they would like to join Project ECHO programs for other diseases, if such programs exist. Table 5, below, gives more detail about the participants' opinion on ECHO sessions.

Table 5: Feedback from Participants on ECHO Sessions (N=62)

Statements	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Project ECHO has reduced my professional isolation	1 (1.6)	1 (1.6)	4 (6.5)	34 (54.8)	22 (35.5)
My participation in the TeleECHO sessions has enhanced my professional satisfaction	1 (1.6)	1 (1.6)	6 (9.7)	32 (51.6)	22 (35.5)
Access to the TeleECHO sessions has improved the quality of care I provide to the patients at my clinic	0 (0)	0 (0)	11 (17.7)	34 (54.8)	17 (27.4)
Access to HIV specialist expertise and consultation is a major area of need for me and my clinic	1 (1.6)	3 (4.8)	2 (3.2)	29 46.8)	27 (43.6)
The presentations during the TeleECHO sessions provide me with useful up-to-date knowledge	1 (1.6)	2 (3.3)	2 (3.3)	35 (57.4)	21 (34.4)
The case-based discussions during the Project ECHO sessions were not always relevant to my clinical practice and how I care for patients in my clinic	11 (18)	21 (34.4)	18 (29.5)	11 (18)	0 (0)
ECHO is a useful tool for improving the sharing of information among HIV providers	1 (1.6)	0 (0)	0 (0)	28 (45.9)	32 (52.5)
ECHO is a useful tool for national experts to provide technical assistance in HIV care and treatment	2 (3.3)	2 (3.3)	2 (3.3)	33 (54.1)	22 (36.1)
I would like to join Project ECHO programs for other diseases, if the program existed	1 (1.6)	0 (0)	1 (1.6)	25 (41)	34 (55.7)
After the pilot project is completed, I do not want to join any more TeleECHO sessions	34 (55.7)	17 (27.9)	5 (8.2)	5 (8.2)	0 (0)
TeleECHO sessions were not always easy to access from the clinic	22 (36.1)	20 (32.8)	10 (16.4)	8 (13.1)	1 (1.6)

ACCESS TO AN HIV EXPERT AND CLINICAL SHARING, BASELINE, AND FOLLOW-UP SURVEY RESPONSE COMPARISONS

Access to an HIV expert

During the baseline survey, 73.4% of participants reported having timely access (defined as a response of agree or strongly agree) to an HIV expert in their respective regions when they needed clinical support or assistance. This proportion increased to 80% of the participants during the post-test evaluation (Figure 2).

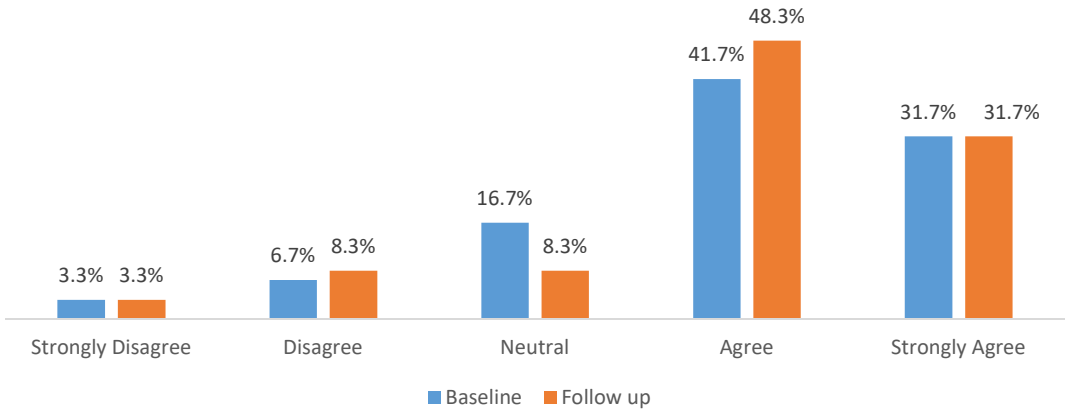

Figure 3: Access to an HIV expert, baseline, and follow-up survey response comparisons (N=60)

Baseline survey response indicated 80% of participants reported having opportunities to share clinical experience (defined as a response of agree or strongly agree) with their colleagues on a regular basis. This increased to 85% of respondents in the follow-up survey, after their participation in the Project ECHO pilot phase (Figure 3).

Opportunities to share clinical experience with their colleagues

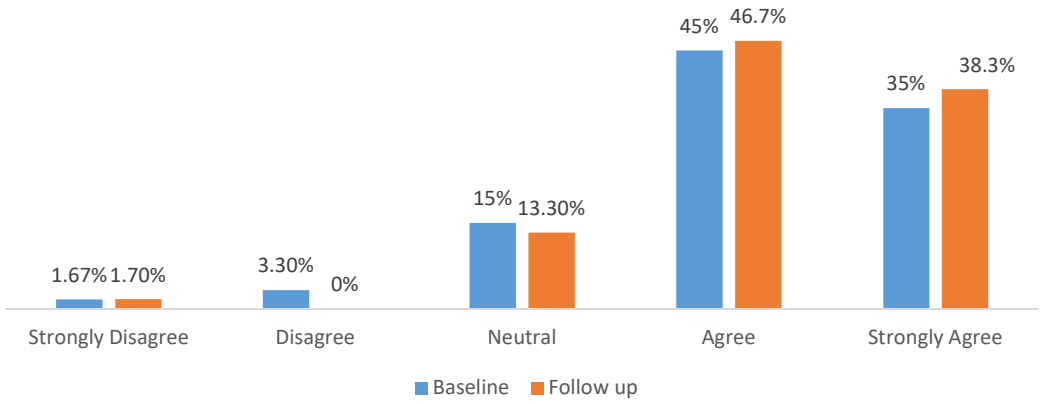

Figure 4: Clinical sharing, baseline, and follow-up survey response comparisons (N=60)

ACCESS TO A QI COACH AND QI ACTIVITIES SHARING, DURING BASELINE AND FOLLOW-UP SURVEY

Access to a QI coach

The score for having timely access to a QI coach in their respective regions when they needed support with implementing QI projects was the same (76.2%) for the pre-test evaluation and post-test evaluation (defined as a response of agree or strongly agree). (See Figure 4 for details.)

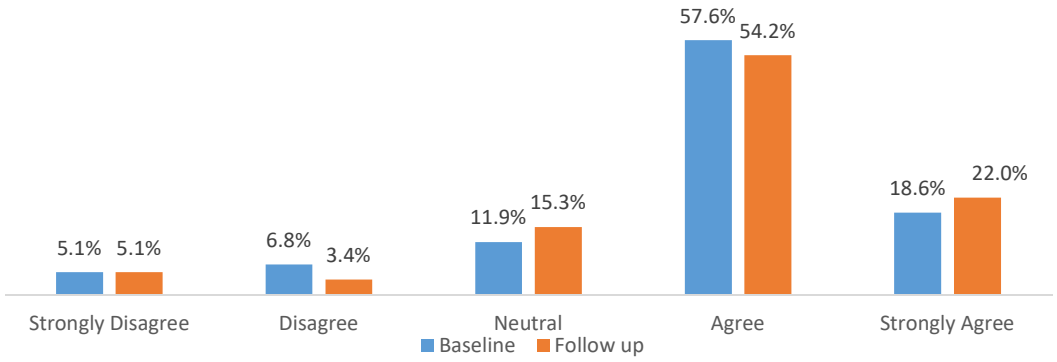

Figure 5: Access to a QI coach, baseline, and follow-up survey response comparisons (N=59)

QI activities sharing with colleagues

Pre-test evaluation and post-test evaluation responses both indicated that 73.3% of participants reported having opportunities to share QI experience (defined as a response of agree or strongly agree) with their colleagues on a regular basis (Figure 5).

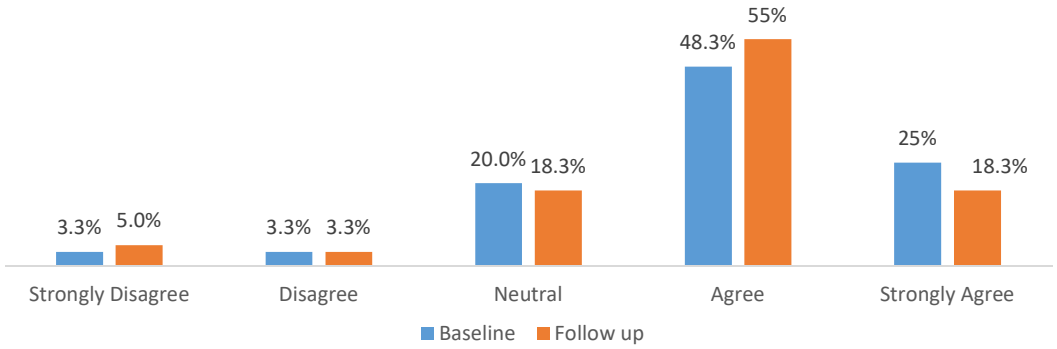

Figure 6: QI experience sharing, baseline, and follow-up survey response comparisons (N=60)

CONFIDENCE TO IMPROVE THE QUALITY OF SERVICES, BASELINE, AND FOLLOW-UP SURVEY RESPONSE COMPARISONS

Pre-test evaluation responses indicated that 74.6% of participants were confident or very confident they can help to improve the quality of services in their outpatient clinics. This decreased to 69.5 during the Project ECHO post-test evaluation (Figure 6).

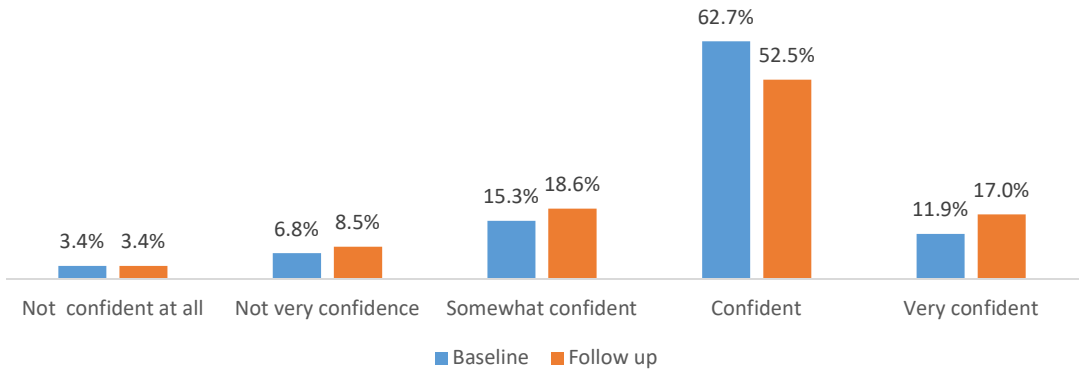

Figure 7: Confidence to improve the quality of services, baseline, and follow-up survey response comparisons (N=59)

PERCEIVED BEHAVIORAL CAPABILITY (COMPETENCE SELF-RATINGS) PRE-TEST EVALUATION AND POST-TEST EVALUATION RESPONSE COMPARISONS

Perceived behavioral capability was rated using the following rating key: 1 = none or no skill at all; 2 = vague knowledge, skills, or competence; 3 = slight knowledge, skills, or competence; 4 = average among my peers; 5 = competent; 6 = very competent; 7 = expert, teach others.

Perceived behavioral capability assessment

Scoring for the perceived behavioral capability assessment is based on the total sum of responses on a Likert scale. There were 16 items about clinical competency included, and each item was assigned a response value of one to seven. A maximum total of 112 points could be earned across all of the items.

There was improvement in reported perceived behavioral capability of HIV case management in the post-test evaluation as compared to the pre-test evaluation. In fact, the mean score was 61.2 in the pre-test evaluation, a score that increased to 66.7 in the post-test evaluation. This difference was significant at the 95% confidence interval for the t-test ($p<0.01$, as shown in Table 6).

Table 6: Self-assessment for Perceived Behavioral Capability (N=51)

N=51	Baseline average score	Follow-up average score	Difference in score: pre-test vs. post-test	P-value
Ability to provide prophylaxis, diagnose, and manage common opportunistic infections (OIs) for adults and adolescents	3.8	3.9	0.1	0.34
Ability to provide prophylaxis, diagnose, and manage common opportunistic infections in children	3.4	3.6	0.2	0.14
Ability to determine eligibility for ART in adults, adolescents, and children	4.1	4.6	0.5	0.003
Ability to counsel pregnant women for ART (PMTCT)	4.4	4.6	0.2	0.13

N=51	Baseline average score	Follow-up average score	Difference in score: pre-test vs. post-test	P-value
Ability to provide and interpret early infant diagnosis and management of infants perinatally exposed to HIV	3.27	3.7	0.4	0.02
Ability to prescribe first-line ARV regimens for all patients	4.2	4.7	0.5	0.003
Ability to recognize and manage side effects of ARV medicines for all patients	3.9	4.5	0.6	0.002
Ability to diagnose and manage treatment failure in adults and adolescents, including prescribing second-line regimens	3.6	3.9	0.3	0.08
Ability to diagnose and manage treatment failure in children, including prescribing second-line regimens	3.1	3.6	0.5	0.004
Ability to interpret the results of viral load testing for all patients	4.5	4.6	0.1	0.22
Ability to manage tuberculosis coinfection in HIV-infected adults	3.5	3.9	0.4	0.02
Ability to manage tuberculosis coinfection in HIV-infected children	3	3.4	0.4	0.008
Ability to counsel discordant couples in birth control, STIs, and conception issues	4.5	4.7	0.2	0.19
Ability to guide caregivers through the HIV disclosure process leading to successful HIV status disclosure to children	3.8	3.9	0.1	0.27
Ability to counsel adolescents in their transition from pediatric to adult care and treatment	3.8	4.3	0.5	0.02
Ability to serve as the HIV expert in the district/region	3.9	4.31	0.41	0.046
Total	61.2	66.7	5.5	0.01

Perceived behavioral capability in quality improvement

There were eight items measuring QI competency in the pre-test and post-test questionnaires. Response categories were on a seven-point Likert scale, with assigned values of one to seven. A total of 56 points was the maximum number of points that could be earned across all of the items.

There was improvement in reported perceived behavioral capability of HIV care and treatment in the post-test evaluation compared to the pre-test. In fact, the mean score was 29.4 in the pre-test evaluation. This increased to 33 in the post-test. This difference was significant at the 5% threshold for the t-test ($p<0.01$).

Table 7: Perceived Behavioral Capability in Quality Improvement

Characteristics N=52	Baseline average score	Follow-up average score	Difference in Score: pre-test vs. post-test	P-value
Ability to measure quality in your clinic (performance measure)	3.7	4	0.3	0.12
Ability to understand performance measurement results	3.7	4.1	0.4	0.06
Ability to determine the cause of a gap in quality (determine the root cause of a quality problem)	3.8	4.2	0.4	0.04
Ability to design a plan to improve a quality problem	3.7	4.1	0.4	0.04
Ability to implement and monitor a QI plan	3.7	4.3	0.6	0.004
Ability to make change and improve the overall quality of care in your clinic	3.7	4.4	0.7	0.003
Ability to coach others to improve quality	3.7	4.2	0.5	0.01
Ability to serve as a QI expert in your district/region	3.4	3.8	0.4	0.05
TOTAL	**29.4**	**33**	**3.6**	**0.01**

Perceived behavioral capability in quality improvement by site and type of provider

The difference between the post-test and pre-test scores was positive in each of the sites. This difference was greater in Daoukro GH (24.7 to 30.7) and lower in Abengourou RHC (33.9 to 34.4). However, it was not significant in any of the sites at a 5% threshold for the Wilcoxon signed-rank test.

In addition, the difference between the pre- and post-test scores was negative only for nurse's assistants. This difference was greater among pharmacists (23–42) and significant only among physicians at the 5% threshold of the Wilcoxon signed-rank test ($p<0.04$). (Table 8).

Table 8: Perceived Behavioral Capability in Quality Improvement, by Site and Type of Provider

Site names	Pre-test average score	Post-test average score	Difference in score: pre-test vs. post-test	Wilcoxon signed-rank test
Abengourou RHC	33.9	34.4	0.5	0.72
Daloa RHC	29.8	34	4.2	0.5
San-Pedro RHC	30.3	33.4	3.1	0.2
Yamoussoukro RHC	30.8	30.8	0	1
Daoukro GH	27.5	35.3	7.8	0.12
Port-Bouët GH	24.7	30.7	6	0.15

Site names	Pre-test average score	Post-test average score	Difference in score: pre-test vs. post-test	Wilcoxon signed-rank test
Type of provider	**Pre-test average score**	**Post-test average score**	**Difference in score: pre-test vs. post-test**	**Wilcoxon signed-rank test**
Medical doctor	31.9	37.1	5.2	0.04
Pharmacist	23	42	19	0.18
Nurse	28.7	32	3.3	0.31
Midwife	20.5	24.5	4	0.18
Social worker	29.2	30.3	1.1	0.75
Caregiver	25	18.7	-6.3	1
Computer scientist	30.5	38.5	8	0.07
Administrative staff	40.5	26	14.5	0.18
Laboratory staff	28	38	10	0.32

PARTICIPATION IN QI SESSIONS

Forty-nine percent of participants in the pre-test evaluation reported having taken part in Project ECHO QI sessions. Seventy percent of them were confident that the QI sessions were of good quality. Moreover, 93.4% said that the QI sessions were useful for their clinic, and 83.4% agreed that Project ECHO improved their access to a QI coach.

Ninety-seven percent of the participants felt that Project ECHO contributed to the improvement of the quality of HIV care in their clinics. The same percentage also reported that Project ECHO improved their motivation to carry out QI activities in their clinics, and that ECHO was a useful model for sharing QI success stories between clinics and health care providers (Table 9).

Table 9: Participation in QI Sessions

Characteristics	N (%)
Participation in any Project ECHO QI sessions	**N=61**
Yes	30 (49.2)
No	31 (50.8)
Rating of the quality of the QI sessions	**N=30**
Average	9 (30)
Good quality	17 (56.7)
Very good quality	4 (13.3)
Utility level of QI sessions	**N=30**
Somewhat useful	2 (6.7)
Useful	20 (66.7)
Very useful	8 (26.7)

Characteristics	N (%)
Project ECHO has improved my access to a QI coach	**N=30**
Strongly disagree	1 (3.33)
Disagree	0 (0)
Neutral	4 (13.3)
Agree	20 (66.7)
Strongly Agree	5 (16.7)
Project ECHO has improved the quality of care in my clinic	**N=30**
Strongly disagree	0 (0)
Disagree	0 (0)
Neutral	1 (3.3)
Agree	20 (66.7)
Strongly Agree	9 (30)
Project ECHO has improved my motivation to do QI activities at my clinic	**N=30**
Strongly disagree	0 (0)
Disagree	0 (0)
Neutral	1 (3.3)
Agree	17 (56.7)
Strongly Agree	12 (40)
Project ECHO is a useful tool for sharing QI success stories among clinics and providers	**N=30**
Strongly disagree	0(0)
Disagree	0(0)
Neutral	1 (3.3)
Agree	16 (53.3)
Strongly Agree	13 13 (43.3)

LEARNING ABOUT PROJECT ECHO AND RATING OF THE ECHO PILOT

The majority (86.9%) of participants during the post-test evaluation reported having found out about Project ECHO because their region was selected to participate in the pilot. Also, the majority (91.8%) of participants found the session topics to be practical for their work.

Most of the participants (86.9%) reported that they used the clinic/hospital computer to participate in the Project ECHO sessions, whereas 11.5% said that they used their personal computer or laptop. Only one reported having used a smartphone to participate in the TeleECHO sessions.

Regarding the quality of the project, most of the participants (98.3%) rated the technical quality of Project ECHO to be average or above average, whereas 42.6% rated it to be of good or very good quality. Almost all (98.4%) participants said that the project should continue. Over two-thirds (67.2%) of the participants

preferred the case study / case presentations, whereas 21.3% indicated that they liked all parts of the sessions.

The majority (77%) of the respondents felt that the length of each session was just enough, while 11.5% thought the sessions were too long, and 11.5% found the sessions to be too short. The majority (96.7%) of the participants would like other topics presented in additional sessions. The first five additional topics of interest indicated were, respectively, diabetes (20.3%), hypertension (18.6%), dermatology (13.6%), and nutrition (8.1%). Among the participants, 84.8% preferred sessions on every Thursday, 89.8% preferred sessions in the afternoon, and 79.7% said one hour is the most appropriate length of time for the weekly sessions.

Among assessed participants, 98.3% said they thought other specialists from other specialties needed to be invited to the sessions, and some suggested specialists such as dermatologists (24.4%), diabetologists (22%), cardiologists (20.3%), nutritionists (13.6%), and gynecologists (11.9%) should attend. (See Table 10.)

Table 10: Impressions and Perspectives of the Participants

Characteristics	N (%)
How the participant heard about Project ECHO	**N=61**
Introduction from training courses and conferences	4 (6.6)
Introduction from colleagues/friends	4 (6.6)
Because my region was chosen to participate	53 (86.9)
How practical were the session topics to your work?	**N=61**
Somewhat practical	5 (8.2)
Practical	32 (52.5)
Very practical	24 (39.3)
Which device did you most often use to participate in Project ECHO ?	**N=61**
Clinic / hospital computer	53 (86.9)
Personal computer or laptop	7 (11.5)
Smartphone	1 (1.6)
How do you generally evaluate the technical quality (Internet access, sound, and picture) of the sessions?	**N=61**
Weak	1 (1.6)
Average	34 (55.7)
Good	21 (34.4)
Very Good	5 (8.2)
Do you think the project should be continued?	**N=61**
Yes	60 (98.4)
No	1 (1.6)

Characteristics	N (%)
Which segment of the sessions do you like most?	**N=61**
Case conference / Case presentations	41 (67.2)
Seminar/Lecture	7 (11.5)
All	13 (21.3)
What do you think about the length of each session?	**N=61**
Just enough	47 (77)
Too short	7 (11.5)
Too long	7 (11.5)
Would you like other topics presented in additional sessions?	**N=61**
Yes	59 (96.7)
No	2 (3.3)
Day most appropriate	
Tuesday	2 (3.4)
Wednesday	5 (8.5)
Thursday	50 (84.7)
Friday	2 (3.4)
Time of day most appropriate	
Morning	6 (10.2)
Afternoon	53 (89.8)
Length most appropriate	
1 hour	47 (79.7)
>1 hour	12 (19.3)
Do you think other specialists from other specialties need to be invited?	
Yes	59 (98.3)
No	1 (1.7)

PRE- AND POST-TEST PROFESSIONAL SATISFACTION RATING BY PARTICIPANTS

During the post-test evaluation, 79, 3% of the participants reported having been satisfied or very satisfied with their professional experience, compared to only 67.2% during the pre-test evaluation (Figure 7).

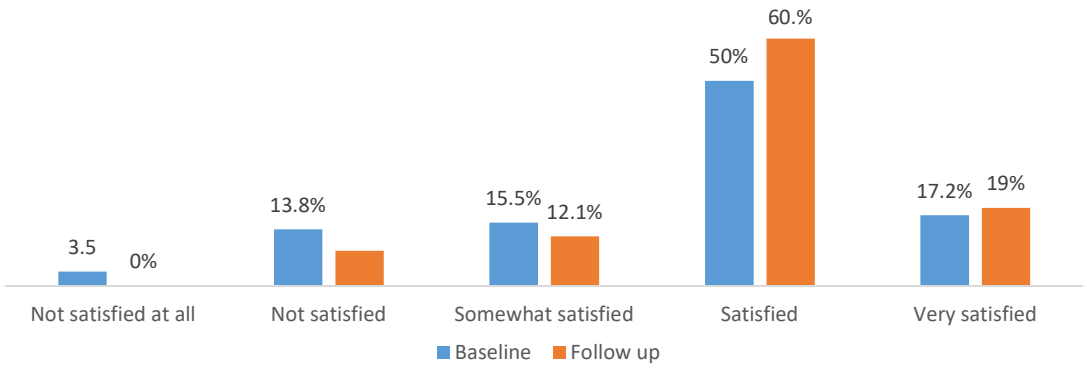

Figure 8: Professional satisfaction rating by participants (N=58)

ANALYSIS OF THE PRE- AND POST-TEST DATA FOR THE KNOWLEDGE QUESTIONNAIRE

The knowledge assessment was divided into seven sections: (1) test and treat all; (2) adult care and treatment; (3) care and treatment for children and adolescents; (4) treatment literacy and adherence; (5) retention into care; (6) TB/HIV coinfection; and (7) HIV/HBV coinfection. All unanswered questions, depicted by missing values, were assumed to be incorrect answers.

Pre-test and post-test responses were evaluated for matching, and it was determined that 62 participants took both the pre-test and post-test. The range of score, and score mean, for the pre-test were 8–92, and 48.6, respectively. In the post-test, the range of scores was 6–100, and the mean was 75.1 for all matched participants. The overall average difference for matched scores was 26.5, which was statistically significant ($p<0.01$). In addition, 8.1% of participants for the pre-test correctly answered 75% of the questions, versus 58.5% of the participants for the post-test, who correctly answered 75% of questions (this difference is statistically significant at the 95% confidence interval). Results on the knowledge assessment are shown in Table 11.

Pre- and post-test scores were evaluated by site, and the mean difference between pre- and post-test scores for all participating Project ECHO sites was positive, ranging between 14.4 (Abengourou RHC) and 40.6 (Daloa RHC). This difference was not significant at the 5% threshold of the Wilcoxon signed-rank test ($p<0.1$) in Abengourou RHC only.

Pre-test and post-test scores also were evaluated by profession, and the mean difference between pre- and post-test scores for all professions participating in Project ECHO was positive, ranging between 15 (administrative staff) and 57 (pharmacists). This difference was significant at the 5% threshold of the Wilcoxon signed-rank test for medical doctors and nurses only. (See Table 11.)

Table 11: Matched Pre- and Post-test Knowledge Assessment Scores, Overall, by Site and by Type of Provider

	Mean pre-test score	Range	Mean post-test score	Range	Mean difference	P-value
All	48.6	8-92	75.1	6-100	26.5	0
Site						
Abengourou RHC	57	8-88	71.4	6-100	14.4	0.1
Daloa RHC	43.1	20-68	83.7	78-88	40.6	0.01
San -Pedro RHC	54.8	40-76	70.8	44-100	16	0.01
Yamoussoukro RHC	49.8	28-92	83.8	72-100	34	0.01
Daoukro GH	44	20-72	94.4	92-100	50.4	0.01
Port-Bouët GH	40.8	8-60	54.3	30-70	13.5	0.01
Type of Provider						
Doctor	58.9	20-92	80.4	50-100	21.5	0.01
Pharmacist	37	20-54	94	92-96	57	0.18
Nurse	48	8-88	73.3	6-100	25.3	0.01
Midwife	42	40-44	62	56-68	20	0.18
Social worker	48.8	30-68	81.3	68-92	32.5	0.01
Caregiver	59.3	32-80	78.7	60-88	19.4	0.11
Computer scientist	35	24-44	76.5	54-100	41.5	0.08
Administrative staff	46	44-48	61	50-72	15	0.18
Laboratory staff	34.7	24-54	39.3	30-56	4.6	0.1

The difference between the average pre-test score and the post-test score for each question is positive. This difference is greater for question four (39.2 to 90.3) and lower for question three (89.2 to 96.8). (See Figure 8.)

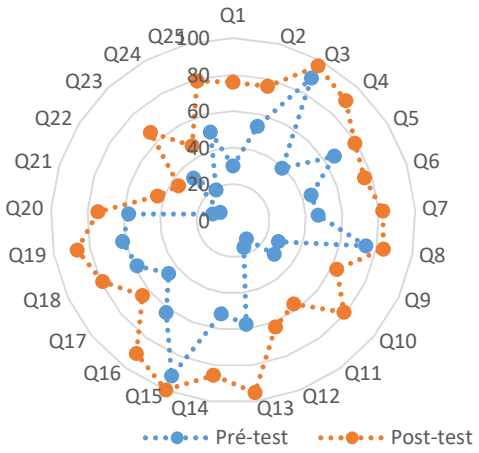

Figure 9: Percentage of correct answers per question, matched pre- and post-test (N=62)

Focus Group Discussions and In-depth Interviews

Focus group discussions (FGDs) and in-depth interviews (IDIs) were conducted to qualitatively assess acceptability of the ECHO model, and experiences of participants in the program. A total of four FGDs and seven IDIs were held after the last ECHO session was completed. Semi-structured focus group and interview guides were used to explore key themes about feasibility in accessing ECHO sessions, opinions regarding the format of ECHO sessions, relevance of the content of the sessions, and experiences in using and sharing information learned through ECHO sessions. Findings from the qualitative data collection are described in this section of the report.

FEASIBILITY AND ACCEPTABILITY OF THE ECHO MODEL IN CÔTE D'IVOIRE

Provider training and experiences with HIV

During the FGDs and IDIs of the post-pilot evaluation of the ECHO project, respondents were asked about their previous HIV training and experience in caring for people living with HIV (PLHIV).

In terms of HIV training, data collected from two categories of providers stood out. The first consists of doctors and pharmacists who reported receiving additional HIV training beyond the basic knowledge gained during their academic coursework. For the vast majority of doctors and pharmacists, the additional training consists of workshops organized either by state structures (the PNPEC, the PNLS, the Institute Pasteur, etc.), or by implementing partners (EGPAF, ARIEL). For a minority, the additional training was through coaching from a clinical HIV mentor. In addition, two physicians had the opportunity to earn a certificate from a course specifically designed for training in the care of PLHIV, earned outside the country.

On the other hand, there was a proportion of respondents who said that they have not had HIV training apart from basic information acquired during their academic coursework. This was mainly the case for nurses and midwives, but other cadres of health workers had a similar experience, particularly pharmacists. As one nurse said when asked if she received previous training in HIV case management,

"Not really. We learned on the ground. I mean, at school they talked a bit about it, but it was on the ground that we were confronted [with HIV case management,] and during my internships too, I did at least six months of an internship in infectious diseases at the University Hospital of Treichville." (Nurse, IDI)

Almost all providers interviewed had at least two years of experience in the HIV field. Participants had some training in specific elements of the provision of care for people living with HIV. Doctors intervene at all levels of care, whether it is counseling and testing, prescribing ARVs, psychological care, or therapeutic education of patients. Pharmacists ensure the appropriate dispensing of ARVs, and in some cases are in charge of coordinating HIV activities as the focal point for HIV care at the facility where they work.

"*I do the counseling and propose the tests. Then I take care of HIV- positive patients. I am the focal point for HIV/AIDS activities at the hospital, and I also coordinate activities.*" *(Physician, FGD participant)*

"I do pediatric care, everything related to counseling, testing, PMTCT, and the support group." (Physician, FGD participant)

"As the focal point of the General Hospital of Port-Bouët, I used to coordinate all the activities related to HIV care of all our patients who are receiving HIV services at our site. I serve as a bridge between everything that happens in the hospital and outside, and then in terms of providing services I take care of patients, especially adolescents. So here I do general medicine consultations, and then I take care of people living with HIV. Then I also coordinate all site activities related to HIV/AIDS." (Physician, IDI participant)

"In terms of HIV care, since I am the leader (of the improvement of the quality of care for people living with HIV/AIDS), I intervene everywhere, from prescription to viral load testing to pre-dispensing services. I intervene everywhere in the case where a blockage might occur. For example, at the level of the viral load, the result of a viral load test did not arrive immediately. It was retained in the laboratory. It was necessary that the provider go there, to benefit from the results of the viral load. So I intervened and asked the laboratory head to send the printed viral load results to the provider, if possible, by mail. This brought the doctor up to date on the PLHIV care, and gave him the needed information to make a good decision."(Pharmacist, IDI participant)

The nurses and midwives said that their role is generally limited to counseling and testing and enrollment of HIV-positive patients into ART services. Unlike pharmacists and physicians, nurses and midwives do not serve as focal points or coordinators of HIV care activities at the facilities where they work. The typical role of nurses and midwives is described by one participant,

"…I am not in HIV care service, but as I am in general medicine service, all the patients we receive are tested for HIV. So when we test an HIV-positive patient, we refer them to social services. It's a bit like that. This means that when you have an HIV-positive person, you have to first put him or her in a good psychological condition, and give advice. I sometimes try to follow patients, and even keep their phone numbers, in order to easily contact them later. But for their HIV care and drug delivery, there is a specific office for that." (Nurse, IDI participant)

PARTICIPATION TO THE TELEECHO SESSIONS

Level of participation of all providers

Participation in the ECHO sessions across all cadres of health care workers was high among those who attended.

The majority of participants said that they have attended at least 15 of the 25 ECHO sessions. Those attending at least 15 sessions were mostly physicians (8), nurses (5), and pharmacists (2). In addition, three nurses participated in 10 sessions.

While the analysis of the data shows that doctors, pharmacists, and nurses most frequently attend the TeleECHO sessions, this is not the case for the midwives. Indeed, only one midwife participated in the evaluation of the pilot phase of Project ECHO. She attests to attending only five sessions of the 25 TeleECHO sessions programmed. The main reason for this nurse's absence from the majority of the sessions is that most ECHO sessions overlapped with working schedules at the hospital.

"We will perhaps say it's due to the problem of time. Often the ECHO program coincides with working schedules. Either you are at work and then ECHO sessions start, or you have patients to take care of and also pregnant women waiting for deliveries. So we were not always available to come to the Project ECHO sessions, because here the sessions were held every Thursday at 3 o'clock. So when sessions start, and you have patients or deliveries, it is not really easy to attend." (Midwife, IDI participant)

Regarding the level of participation of health providers across the pilot sites, the analysis of the data shows two patterns. Two of the six sites, Port-Bouët and Yamoussoukro, had a high rate of participation of health care providers, and the other sites of Daloa, San--Pedro, Daoukro and Abengourou had similar lower rates of participation among health provider staff.

In Port-Bouët and Yamoussoukro, most of those interviewed felt that the level of participation was excellent because the majority of caregivers involved in HIV care and treatment among PLHIV were present. According to them, the providers were enthusiastic to participate because of the perceived benefits of the ECHO project. One participant said of the cross-department participation in ECHO sessions,

"Concerning Yamoussoukro, the team was there. The counselors were there, (name of staff) was present, me too. There was social assistance that was still there, the head of the sexually transmitted diseases was there, the nurse too. We could have had many more people, but I think the number was already representative." (Physician, FGD participant)

Regarding Daloa, San-Pedro, Daoukro and Abengourou, almost all participants said that there was not overwhelming enthusiasm among HIV care staff for their participation in the TeleECHO sessions. One participant confided that on his site, which had just 26 health care providers, only two nurses and three midwives were interested in the ECHO sessions.

"The majority of my collaborators are not involved. They do not even want to do the session. I often threaten them by saying that if you do not attend the ECHO sessions, I will not rate you well. I use a little pressure to make them come, and when they come they are happy because of what they learned. They say it's good to attend, but then the following Thursday they do not come anymore. We must still put pressure on them to come. So they are not really involved. We should turn HIV treatment over to the nurses. But they refuse, even though we have 26 nurses in the hospital. Only two nurses have agreed to be permanently in the HIV-renewal service, and they say that there is no money, and that we are forcing them to do extra work." (Physician, IDI participant)

One participant pointed out that the non-participation of providers has the consequence of delaying the adoption of good practices in the PLHIV care process. This is reflected in the following comment,

"My team, with whom I work, I think their presence at the ECHO sessions would have been helpful for the whole team, because when you offer new ideas about treatment, others could ask you where you learned this. And, you have to call the doctor so that he can actually tell them that you are right and it is true. So sometimes this makes you delay patient care. If others also participated in the project, you could say, for example, that it was at such and such a session that we saw [this care,] and therefore we should not do this, or act this way. But as others do not come to the sessions, [we can't share like this]. When we sometimes face problems in a patient's care, we are alone in talking, and then [others] think you are exaggerating, and they ask questions like, is what you say true?" (Physician, IDI participant)

Reasons for non-participation

According to the providers interviewed, the reasons that might explain the non-involvement of certain health care workers involved perceptions of who the ECHO sessions were intended for; the perception that ECHO sessions would increase the work burden; the lack of time to attend sessions, particularly where the sessions overlapped with patient care activities; the limited financial or other incentives, such as no coffee breaks and no training certificates offered; and the fact that ECHO learning objectives did not cover certain providers' areas of specialty.

"During sessions, I often see on the screen that there are only two other people attending. It gives me the impression that these people monopolized TeleECHO devices, as if they are the ones who must do the TeleECHO sessions. I went to a city that I will not mention the name of, and I asked my cousin, a pharmacist, why do you not attend TeleECHO? I even explained to him that to attend was good, and that I want him to give his opinion about the ECHO project. He tells me, 'the sessions seem to be the property of some of the health care workers hiding themselves in an office.' Therefore, he told me that he was not interested at all, and I tried to explain to him that he is doing the ARV supply chain, so he should attend. But he refused, because he thought that the ECHO project is the property of some of the staff at the site. (Pharmacist, IDI participant).

SOURCES OF MOTIVATION FOR ECHO SESSION PARTICIPATION

Participants, regardless of their training, are all unanimous on the point that they have a real need in capacity-building skills in terms of performing HIV case management. Indeed, many participants acknowledged that they have a knowledge gap in the management of PLHIV in the sense that most of their knowledge on the subject is basic and comes from their academic training. In addition, there are few opportunities to participate in training on HIV care and treatment. There was a desire to fill this gap, and the willingness to acquire new knowledge, in order to improve the care of people living with HIV, mainly underlies providers' motivation to participate in ECHO sessions. These participants' remarks illustrate this point,

"…It's the thirst for knowledge. In fact, we found that just after college, or after what we have learned from the university, we do not read any more books, or receive any more advice, regarding our clinical practice. When things are not going well, we have to go to Abidjan to learn about new practices and guidelines. But[with ECHO sessions] we can manage problems on-site. So with the ECHO sessions, we could learn some guidelines, and it would allow us to learn that certain practices are not correct. So in the first few sessions, I saw that there were things I did not know, and that's what motivated me to come regularly to the sessions, to be able to learn, because medical practices grow quickly. And it's an opportunity to learn a lot from specialists and professors, so that we can treat the population well." (Physician, IDI participant)

"What motivated me first [to participate in ECHO] was the desire to learn to practice better, because I learned that in the care that we provide to patient, there was a deficit. There were things that we did not master really." (Nurse, IDI participant)

For health care providers, especially doctors, the ECHO sessions are a real opportunity to improve their knowledge about HIV care because, when working outside of Abidjan, they have missed opportunities in terms of training on the new guidelines for taking care of HIV patients. In addition, it is necessary to retrain, because the prescription of ARVs to patients is now part of the minimum package of duties of the doctor.

Finally, others were motivated by the fact that ECHO sessions combine theory (didactic presentation) with practice (presentation of clinical cases), and especially provide the opportunity to interact with experts.

"In Abidjan, it is more likely to have many large hospitals that take care of PLHIV, many of them staffed by our medical school teachers. In Abidjan, we have all the time to train. This is not the case of those who are in the countryside. For me, TeleECHO is a welcome platform to standardize the management of HIV/AIDS." (Physician, FGD participant)

"The duty of prescribing antiretroviral therapies (ARVs) seems to be spread to every provider! And it is part of the doctor's minimal package of activity. By having this training, I also was worried about continuing training

and upgrading myself. You cannot provide HIV care to patients and not have the minimum knowledge, or maybe at least a vague knowledge, so that's mainly what motivated me." (Physician, FGD participant)

"It's the same thing—the desire to improve our knowledge and capacity to care for people living with HIV/AIDS. During the ECHO project, different interesting topics were discussed, and then there were clinical cases presented. It allowed us to share experiences, and it was very rewarding. It also linked theory with practice." (Physician, FGD participant)

LEVEL OF SATISFACTION BY PARTICIPATING IN TELEECHO SESSION

One of the objectives of this study was to assess the level of satisfaction of health providers who participated in ECHO sessions. Therefore, participants were asked to indicate their satisfaction level on a scale from one to five. Almost all the providers interviewed are very satisfied with their participation in the ECHO project. From their statement, the discussions and recommendations related to the clinical scenarios and didactic presentations met their expectations. Thus, on a scale of one to five, the great majority gave a score of four in their satisfaction with the ECHO sessions, both for clinical cases and for didactic sessions. This satisfaction level is the same among doctors, pharmacists, nurses, and midwives.

"Okay, I could say in all the sessions in which I participated my expectations were filled, based on questions and answers that were given. Therefore, I could rate my satisfaction at four. I cannot arrive at five, because I would not say that I have mastered everything that I've been told here. So I think four is good." (Nurse, FGD participant)

The reasons underlying participants' level of satisfaction are varied. The first reason mentioned was the practical aspect of ECHO sessions, with the sharing of experiences between providers of different sites. For them, through this sharing of experiences in HIV care, they were able to detect errors in their daily care practices and were able to correct them.

"Well, at first, when I was told that there were ECHO sessions, I said that it is good to share the experiences of each other. I really appreciated this, because when we gave the floor to each provider, it allowed us to see what we were doing, to recognize our mistakes and identify our performances." (Physician, FGD participant)

"From one to five, I would say four, because I learned a lot. It is true that we learned HIV care and treatment in theory, but we also learned on the field, and this time we had the opportunity to learn from subject matter experts who are not always with us, because they are in the teaching hospitals. It is easier for health care workers to learn from them, but in general, and at regional hospitals, we are just among colleagues without SME, and we often exchange knowledge on cases, but not always. This time, it was really interesting, because [the training included] clinical cases, and such cases we ourselves also see in our hospitals. [The training] was also an opportunity to share experiences and really learn. So I put four to five." (Physician, IDI participant)

The second reason refers to having benefited from quality training through the intervention of subject matter experts (SMEs), not always accessible to providers in their respective facilities. Indeed, the participants believe that, through the involvement of experts as part of the ECHO sessions, their level of knowledge on HIV, and the care of PLHIV, has been enriched.

"Overall, ECHO sessions were helpful, because they combine clinical cases and didactics in the presentation. I think that overall [the training] helps us a lot, because if I leave where I work here, I will not have someone who will better train me than when I participate in ECHO sessions." (Nurse, IDI participant)

"Good compared to my level of information before the sessions. I think I learned a lot." (Nurse, FGD participant)

In terms of new knowledge acquired, participants mentioned a range of specific procedures, information, practices, and concepts:

- Systematically assessing patients for coinfection during clinical consultation of PLHIV
- The interaction between ARVs with other drugs, which could reduce the effect of ARVs
- The importance of the psychological component in the care for PLHIV
- The retention of PLHIV in care
- The ability to make a differential diagnosis (the signs of certain pathologies being similar, it is necessary to be able to differentiate them and make an exact diagnosis)
- The ability to announce the positive result of an HIV test of a child to his parents

Another essential reason for their satisfaction is due to the fact that the didactic part of the TeleECHO sessions is concise and precise. In general, participants said that the information is well synthesized, which differs from the usual lectures.

"Yes! Yes! This is very good, because after each session, we were sent the electronic support of the session by e-mail. And it is really concise, precise and practical. It's not a screech that really bothers you. Didactically it's perfect. If I should rate it, it's 10 out of 10." (Physician, FGD participant)

"I think the presentations were well done and well synthesized, meaning that essential information was really given to the participants. It was not long lectures, but specific items that we need for our practice. I liked that." (Physician, FGD participant)

Some nurses appreciated that the PowerPoint presentations and diagrams from the sessions were shared with participants. In their opinion, these electronic supports could be very rich documentation if they were shared with the participants.

While overall the participants said they were satisfied with their participation in the ECHO sessions, they pointed out some areas that need to be improved. All the participants were unanimous on the fact that the time allocated to the training sessions (clinical case and didactic part) was insufficient. Participants mentioned the following consequences of not having enough time for each session, and for leaving participants' concerns unresolved:

- The didactic part of the sessions is not completed
- Some aspects of the topic of the day are not deepened by the expert

"Yes, I had the opportunity to intervene but there is a time constraint. If I asked a lot of questions it's like I'm making myself be seen. So there are some questions that I did not want to ask, because once or twice I asked questions and the SMEs avoided answering, so I did not want to ask any more questions. Sometimes, they answered, but they did not really resolve my question. If I remember correctly, it was the question about TB treatment time and ARV treatment. Some say to make two weeks the interval, but others say to initiate the treatment immediately. When I asked the question [that] did not [get] answered, maybe it was because the question was embarrassing, or because there are two different points of view. Others say to wait two weeks before initiating treatment and others say to do it at the same time. I did not have any answer. This is an

example of a question to which I did not get an answer. Otherwise, there are other issues." (Physician, IDI participant)

In addition, some of the participants, who were nurses, wanted to have access to the topics before the sessions took place. Having the material ahead of the session would facilitate learning, giving time to review the material ahead, in order to develop clarifying questions and other queries to ask during the session, and to improve the depth of discussion during the sessions. In addition, these participants deplored the fact that they did not receive the presentation materials after each session.

"I mean, when the SMEs are giving the lecture, if we could have the reading materials before or after each training [it would be helpful.] I guess if the doctor had it, it could be helpful for us too. If you have a support, you can better explain the topic to someone." (Nurse, IDI participant)

Finally, one participant thought that it was not relevant to talk about past clinical cases, because of the impossibility for the provider to make up for prior errors. He wanted new or actual cases to be presented, to allow providers to avoid mistakes and save lives.

"Yes, for me the clinical cases that are being presented have already passed, and we discussed them. So even if there was an error in the care, we cannot correct it, as it has passed. When the experts and mentors are there, at the TeleECHO sessions, I prefer that we take new cases, and talk about what the doctor should offer as treatment. What can the mentors or SMEs bring to us as a benefit, so that the doctors in San-Pedro can quickly correct their mistakes in the patients' HIV/AIDS daily care. I think TeleECHO can contribute for that. We should not be presented cases that have happened three months ago and have the doctor say, 'you should have done this or done that.' I prefer to be told, 'you do this and achieve such a goal.'" (Pharmacist, IDI participant)

OPINION ON PROVIDERS' PARTICIPATION IN ECHO SESSIONS

To learn who participants thought the ECHO sessions would benefit the most, participants were asked to comment on which providers should attend ECHO sessions, and why. From FGDs to IDIs, it appears that participants felt the sessions could be useful for all providers in general.

The main reason for this view is the need for capacity-building. Indeed, respondents felt that it was important for any health care worker to reinforce his or her knowledge, in order to provide quality care services to patients in general, and to PLHIV in particular.

"Yes, because that is relevant for his training. There is already a new ARV treatment protocol. This new protocol is currently being practiced at the RHC [regional hospital center]. However, there are few people who are well aware of that. Each time they call me to ask me, 'Do we need to continue with the old guidelines or [implement] the new ones?' and I say we changed the guidelines, so we must switch to the new guidelines. If they had participated in the ECHO sessions, they would have learned it better, but these providers come each time to ask for certain information that was taught during session and sent already to their mail. I wonder if they read the new treatment protocol [at all]." (Pharmacist, IDI participant)

"Yes, as I said at the beginning, the prescription of ARVs is different from the usual prescriptions, like for malaria. The care process is a little more deep, and a mistake will cost a human life. For instance, when the medication is given to a patient that is not the appropriate [medication,] that puts you in trouble, and disturbs your thoughts. It is therefore important to participate in the TeleECHO sessions with a view toward making drug delivery more collegiate." (Physician, FGD participant)

For other participants in the evaluation, training received at the ECHO sessions should be perceived by each provider as an opportunity, because the ECHO sessions are free of charge to participants, and the quality of the experts who provide these trainings is good. In addition, these participants said that in a different context, the training sessions could be costly for each of the beneficiaries. As a result, participants said that all providers should be involved.

"It's training, and training has a cost. Above all, given the quality of the speakers, and the subject we are discussing during the session, this is training that you should follow. For instance, if it was paid training, it would be training that would cost millions of CFA francs. You have the opportunity to have this training for free. This is a good opportunity." (Pharmacist, IDI participant)

"In my opinion it's obvious. We never stop learning from the experience of others. And in the desire to improve abilities, I think that all providers should at least participate in TeleECHO sessions. It's training that you do not pay for. I mean that it's necessarily profitable for the providers themselves." (Physician, FGD participant)

Finally, one of the participants argued that all care staff should attend ECHO sessions so that change in care practices would be easier to implement.

"If, for instance, everyone came to participate in the TeleECHO sessions, the chain of change would change everywhere. Therefore, when the sweeper came, he learned how to sweep well. When the caregiver came, he or she learned how to care for patients. When the nurse came, he learned what a relative emergency is and what an absolute emergency is. When the doctor came, he learned how to take care of patients, and so on. If all these [people] have an idea of [what to do,] the whole line changes. But, if I am the only one to know what has changed, then you could see that nothing will change. Since the staff did did not participate in the sessions, they will keep their old practices. Even if the doctor has changed his way of caring for the patient, he will have certain practices that he will not like. He could say, for instance, that he was badly received at the hospital by providers. At the next appointment, he will not even desire to come again. So everyone has to participate in the whole chain of change by learning new practices through the ECHO sessions." (Physician, IDI participant)

Participants were asked to identify strategies by which they could motivate all staff at their site to participate in TeleECHO sessions. All participants said they were willing to encourage their staff to attend ECHO sessions. Therefore, participants proposed to raise providers' awareness through the following actions:

- Show them the value of their participation in ECHO sessions
- Regularly invite them to sessions through text messages (SMS) and phone calls as a reminder
- Share training materials with them
- Disseminate materials to all of those who did not attend the training sessions

Some participants suggested that site managers should be involved more in the project. In their opinion, if they sometimes participated in sessions and invited all staff to attend through a memo, the majority of providers would be obliged to participate.

PERTINENCE OF ECHO MODEL

Training format preferences

Participants were asked about their preferences for training methods, and how they preferred to learn. Responses revealed that just over a third of the providers interviewed have a preference for training

through ECHO sessions, primarily among nurses. For them, TeleECHO training is concise, practical, and less expensive, and provides the opportunity to interact with the health experts. In addition, it allows the program to cover a lot of modules and material in a short time, but also to train a large number of providers simultaneously in all health regions.

"ECHO model training is fast, because in less than a few hours we finished several modules. But if it was during a workshop we would not finish. ECHO has offered a lot of training in a short time, and it's better than the seminars. As a proof, last time [the training] for the HIV treatment guidelines went fast. In one week, all regions have been trained through the ECHO platform. But it would not be possible if it were a seminar or workshop." (Physician, IDI participant)

"ECHO allows us to stay in place while attending the training. We leave our service, we come to the conference room, and then we have access to all the information, and it's cheaper for us, and then we have access, as my colleague said, to all the SMEs in any area of medicine." (Nurse, FGD participant)

"The ECHO system is more effective, because it brings together the largest number of people at the same time. For example, you can send everything to the whole Ivory Coast, if needed. While bringing everyone together at a workshop, it's not easy. Certainly they will split and it will not be the same discussion. In fact, the same message will not be passed at the same time for everyone, as it is during ECHO sessions, which offer greater coverage and include everyone participating at the same time. I think [that approach is] more beneficial." (Physician, IDI participant)

Some participants said that they preferred in-person training workshops. Reasons for preferring in-person training workshops over the ECHO distance learning approach were related to travel discovery, per diem pay, and coffee breaks.

"For me, it depends, because in the workshops there is human contact. I can ask to be accommodated in a five-star hotel, while with the TeleEcho sessions, I am here to improve my knowledge and cannot do anything to improve my learning condition. Going out of my living place during workshops is like tourism, and we talk directly to colleagues. In the workshops, I have the chance to eat well, whereas during ECHO sessions you do not give me any food." (Physician, FGD participant)

For the rest of the participants, mainly doctors, the two training methods are complementary. They appreciate the trainings made via TeleECHO as much as they appreciate workshops. In their opinion, it would be better for providers to combine the two types of training methods while building their capacities.

"I think both types of training are important. The workshops are concrete, while TeleEcho sections are virtual, and it is true that we exchange [ideas,] but this is the virtual domain. The virtual and the concrete are not the same thing. On the other hand, for an individual who benefits from both, [the sessions] would be good. So I do not really have a preference. If I have to say something, I prefer both (the virtual with TeleECHO sessions and concrete sessions with the workshops)."(Physician, FGD participant)

As a result of the discussions, almost all participants said that training workshops offer more advantages compared to ECHO sessions, and suggested that ECHO sessions should include the benefits of training workshops.

In addition, in order to better understand the preference for each training method, they were asked to list the advantages and disadvantages of each. The results are summarized in Table 12.

Table 12*:* Pros and Cons of TeleECHO Sessions and Workshops

	TeleECHO Sessions	Workshops
Pros	– Concise and practical training – Access to SMEs – Capacity to tackle many themes at the same time – Sharing of experiences to different sites – Capacity to train a large number of people simultaneously – Less expensive method for the donor – No travel and no fatigue	– Travel discovery, tourism – Comfortable venues – Per diem – Enough time to develop the themes – Relaxing – Use role plays – Training materials available
Cons	– Instability of the Internet connection – No sharing of the training materials – Sessions unfinished, or quick training due to lack of time – No per diem and snacks for participants – Conflict of agenda – Difficulty in using ZOOM technology for some of the participants	– Number of speakers limited – Constraints (working from morning to evening) – Impossibility to pose concerns in real time – Travel risks

SHARING OF KNOWLEDGE

All respondents stated that they shared the knowledge they received during ECHO sessions with other staff members of their team. This sharing of knowledge was helpful for the providers to have at the same level of information, and improves the quality of patient HIV services delivery.

"As my colleague said very often at staff meetings, or since the activities on a daily basis, so the team that works the day and while doing the consultation we use this moment to coach at the same time the team about knowledge we learned from the ECHO sessions. It could be how to conduct a discussion with an infant's mother to accept the test, or how to do the test in a practical way, especially with all the hygiene conditions that need to be observed, the quality of the test, and also how to appreciate it, how to find out if the test is valid or not. Really, it gave us a lot of information that helped to boost the activity in the service." (Nurse, FGD participant)

Regarding the restitution process, various approaches were identified. Thus, most participants claimed to have shared training received during staff meetings or around a clinical case similar to one that was presented at ECHO sessions.

"While yours is around clinical cases, mine is during the staff meetings, where I share new things learned during TeleECHO sessions. For me, [I share] during the staff meetings." (Nurse, FGD participant)

Some participants chose to share new knowledge in each service with the permanent team, because it was not easy to gather all the staff at the same time.

"In fact, I do not organize sharing meetings, because it is difficult to gather all the staff members. It's case by case. That is to say that from Monday to Thursday each team will go to the hospital based on the schedule. So when I arrive in the morning, I go to the nurse's room and share with them what I learned from the discussion. I know that the next day they will not be there, so on three days every morning I make restitution with the staff. This is what I do. It's oral restitution. Because to gather everyone in one place [is difficult.] First, we do not have a conference room, so this is the way that I do the restitution. Every morning, from Monday to Thursday, I know that I will reach the maximum number of people." (Physician, IDI participant)

Others opted for an individual approach. Indeed, they made restitution with their immediate collaborator.

"Yes, with my collaborator at the pharmacy I share notes. I gave her some explanations to upgrade, from what I learned from the ECHO sessions." (Pharmacist, IDI participant)

Also, in this evaluation process, we wanted to identify the factors that could facilitate the sharing of knowledge or the obstacles. According to the data collected, two trends stand out: On one hand, there are sites where restitution was easy, and on the other hand, there are sites where sharing is difficult, due to some obstacles. For some of the respondents, especially those in Yamoussoukro, the sharing of information was made without any difficulty, especially as the providers had the desire to always innovate, to improve the quality of providing health care services. One participant stated that, if necessary, he provided coaching to other staff members. This allowed staff members to immediately implement the knowledge they received from ECHO sessions.

"For me, it was easy. I shared the lessons learned from the TeleECHO sessions with them, and sometimes they asked me a lot of questions. When we have to put certain things into practice, I trained them, and we started to implement [the training]. I talked about it and we did it all together. For example, for the TB screenings, as we were doing the screenings systematically, I made restitution and I saw that with the restitution people get more and more involved." (Physician, FGD participant).

For the remaining group, the sharing of information was not facilitated, due to various obstacles. The first difficulty mentioned refers to the lack of interest in the activity. In fact, some of the respondents said that during the sharing of knowledge from TeleECHO sessions they observed that providers were not receptive, and they also had little interest in the ECHO project. For this reason, two participants admitted that they had to suspend the sharing sessions.

"Well, at the beginning I shared, but when I shared, the way they reacted discouraged me. So I kept [the information] for myself, because when you share, they tell you that it's for you alone. So it's not encouraging to me. I started to keep [information] for myself. If [they weren't present] at the beginning, I explained to them each time, but I had the impression that [the information] did not interest them. Sometimes, I tried to explain to them the right things to do, based on what I heard and what I learned from the sessions. They asked me, 'Why are you so interested in HIV? Do you have anyone infected, or do you have any problem with HIV and every time you come talk to me about HIV or do you want to be HIV infected too.' So sometimes they have ways of talking that really do not encourage me. Otherwise, I talked to them. I approached them and we talked about cases from ECHO sessions. But when someone really does not want to do something it's a bit difficult [to make them do it]." (Nurse, IDI participant)

Another participant was confronted with the lack of willingness of the staff to get really involved in the activity. He noted that during the restitution sessions, the staff did not memorize the information they shared. Therefore, the proper management of certain clinical cases necessarily required his presence.

"I made the restitution to them so that we could be at the same level of information, but when they have a case, they forget the recommendation that I made to them. They call me to say that there is a problem with a patient, and I tell them that I already told you what you should do. They tend not to memorize, because they really do not want to get involved in HIV care and treatment." (Physician, IDI participant)

The last difficulty arose from the fact that, during the training sessions, certain aspects were not well assimilated. As a result, restitution was a bit difficult.

"Sometimes there were difficulties because in the different [ECHO] sessions there were some points that were still vague and points that seemed a little bit difficult. I could not exchange [certain] points, because I did not master them very well." (Nurse, IDI participant)

OPINION ON ZOOM TECHNOLOGY

One of the objectives of the study was to gather feedback from participants on the technology used in the ECHO project. Thus, participants were asked to identify the strengths and weaknesses of the ZOOM technology. The results are presented in the following paragraphs.

Strengths of the ZOOM technology

From collected data, it appears that providers, overall, appreciated the ZOOM technology. They believed that this technology was an innovation that offered the opportunity to interact with subject matter experts and other remote providers. In addition, this technology allowed the provider to have the information, regardless of its geographical position, and in real time. Finally, a minority believed that the management of ECHO equipment was easy.

"I think it's good. It's really necessary." (Nurse, IDI participant)

Interviewer: Why do you think it's good, why do you like it?

"Well, it is this material that allowed us to be able to live there, to be able to communicate. To use it in this way is really helpful. The computer allows us to have the support [we need]." (Nurse, IDI participant)

"I think it's already good. It's an innovation that we need in our system. The technology is interesting. Interacting with someone at a distance, as if that person is with you— this is good enough. Regarding Zoom tools management, I think it's as simple as using a computer." (Pharmacist, IDI participant)

"Yes, it's an advanced technology. With this technology, you can stay somewhere and benefit from other providers, and this is a good thing." (Nurse, FGD participant)

Weaknesses of the ZOOM technology

Despite the benefits of this technology, the providers did identify some challenges that could hinder the implementation of the project. First, instability with the Internet connection has been observed. This instability, at times, did not allow the participants to follow the didactics sessions in a fluid and effective way. Some participants mentioned the fact of having missed sessions because the transmission was totally interrupted.

"It is true that sometimes we are dealing with small challenges related to the Internet. This is not necessarily related to the project, but it is the case for all activities that are technology- dependent. There could be some small technological concerns. Sometimes it's hard to hear the SMEs, or we could have a break [in connectivity] while the session just started or is underway." (Midwife, IDI participant)

"This is a network issue. We cannot do anything about it, and when there is no network we are obliged to stop following the session. For instance, during the last ECHO session, the network was interrupted and there was no network at all." (Nurse, FGD participant)

On the other hand, some participants noted the difficulty of using ECHO material. Indeed, some said that the equipment was not easy to use and that it imperatively required the support from the ECHO focal point. When the focal point was not available, that could cause interruptions or inability to attend ECHO sessions. To solve this problem, one suggestion was that all participants should receive training on using ZOOM technology.

"It is not always easy, because not everyone has mastered the computer, and there are manipulations that can make you lose some information. It's mostly manipulation. If there are any suggestions, they are to have a staff member who is dedicated to managing the ECHO equipment, or just a little bit of training to be able to manipulate the material." (Nurse, IDI participant)

"There are times when the focal point is not there and it is difficult to install the ECHO material. We have problems while listening to the sessions. Due to the low volume of the speakers, there are [words] that can be [lost]." (Pharmacist, IDI participant)

CHALLENGES RELATED TO THE IMPLEMENTATION OF PROJECT ECHO

The ECHO project aims to provide a virtual training platform and an additional mentoring system for strengthening the skills and abilities of health care providers, with the effect of providing high-quality HIV services to PLHIV. One of the pilot phase evaluation objectives is to identify the challenges related to its implementation. Thus, from the analysis of the data collected, three factors that could impede the smooth functioning of the ECHO model were identified by the participants.

Lack of interest from care provider

According to the participants, the first factor that could undermine the implementation of the ECHO model in Côte d'Ivoire is the lack of interest of beneficiaries (health workers) toward the project. Indeed, data analysis revealed that ECHO training sessions across all pilot sites did not meet the interest of all medical staff. This can be seen through the following remarks.

"We did see some sites where there are just two or three people attending the session. You can offer incentives to regular ECHO participants." (Physician, FGD participant).

"I think they are not motivated. As in everything, you have to decide [what's important]. They have not decided yet to join the project. Sometimes they do not live far away, but they do not want to come and attend the session. Sometimes we are working, and then it is time for the session, and there are no patients, and I tell them, 'We should go to participate in Project ECHO.' and they will tell me, 'Go attend, and then afterwards you can explain [things] to us.' You can see, based on that, they do not have any interest in the ECHO project." (Nurse, IDI participant)

Thus, the lack of interest from most providers and collaborators could be explained by the fact that the ECHO model does not benefit them in terms of financial incentives, coffee breaks, snacks, and training certificates.

"The reason they do not want to get involved is because there is no money. For them, all work deserves a salary. They already have a job, and any additional work deserves additional pay. Even the district health director had to force the nurses to do the activity by threatening them, by telling them that whoever does not do the activity will be assigned to a remote village. So it's difficult to put the activity in place. In addition, they are all my

collaborators. If I denounce the most recalcitrant, the others will have a bad eye on me." (Physician, IDI participant)

"Yes, there are some people who have been demotivated because they hope to have a training certificate. But when they understood that they would not have any certificate they stopped coming." (Physician, IDI participant).

"I do not know if the TeleECHO project has sufficient means, but they should motivate health care workers through coffee breaks. I'm not saying this because I'm a health care worker. [I'm saying it] on behalf of all health care workers. They love motivation. If at each TeleECHO session there were a coffee break, I think it would be nice." (Pharmacist, IDI participant)

The other reason of non-participation of providers is that the topics during the ECHO sessions are often not relevant to the providers' areas of work.

"I think it's a matter of interest. What interest do I have in participating in the TeleECHO sessions if I am a surgeon? TeleECHO talks more about HIV/AIDS and opportunistic diseases. As a surgeon and an expert in the field, I have nothing to do with HIV/AIDS. Sure, I protect myself with my gloves, but we do not talk about surgery during ECHO sessions. I haven't an interest in going to the TeleECHO sessions. At this CHR we had several services. Even the dentist does not attend the TeleECHO sessions. What would be the interest for him to come to TeleECHO sessions? He wonders what TeleECHO will bring him, or what he will bring too. The people you see at TeleECHO are providers of HIV/AIDS services. I think that when topics about other services are introduced you will see that there will be more people participating." (Pharmacist, IDI participant)

Internet connection

The majority of participants pointed out the instability of the Internet connection as the second factor that may be an obstacle in the implementation of this project. Indeed, they argue that during ECHO sessions, the quality of the Internet connection has caused disruptions, especially on the quality of transmission (images and sound). At times, it was impossible for them to follow the training sessions.

"The challenge that we usually have is the Internet connection. It often makes us uncomfortable. Because once we are cut off from everything we cannot follow an ECHO session. This is a real concern. This is a disadvantage for us." (Nurse, FGD participant)

"The big difficulty is the Internet connection. There are some remote areas where the connection is unstable, so suddenly the images are cut off, which creates a lot of problems while following the ECHO sessions." (Pharmacist, IDI participant).

Finally, participants said the SMEs used complex and technical language. Indeed, some participants, including nurses and midwives, felt that the SMEs geared their sessions to physicians, which made the information difficult for other health care workers to understand. Moreover, they pointed out that the terms used by the experts were too technical. As a result, this could be a barrier to their level of understanding of the topic being addressed, even though these providers were among those who frequently provided direct care to patients.

"We are nurses, and SMEs are professors and doctors or other specialists, and they are the ones who presented clinical cases, so I would like them to use simple words easily understandable to us. There are some technical themes in medicine that can be expressed in simple words so that we can really understand the meaning and follow the sessions. The themes used here were a little high-level, and we had to ask [for clarification], or write in on paper, or go for further research. Therefore, trainers should go down a bit. [A lower] level is really necessary for nurses, who are the first contacts for the patient." (Nurse, FGD participant)

IMPACT OF TELEECHO SESSIONS ON PARTICIPANTS

Impact on participants' knowledge

During this evaluation, the beneficiaries were asked about the impact of their participation in ECHO sessions in terms of improving their knowledge and daily care practices related to HIV services delivery. The analysis of the data collected indicates that their participation in TeleECHO sessions improved their knowledge related to PLHIV care and treatment.

"We wanted to learn, and we dedicated our time to learning. It brought us new knowledge that we have today. There is some added value." (Nurse, FGD participant)

However, some participants said that through the ECHO training sessions they perceived not only the importance of conducting *a* systematic search for HIV coinfection and opportunistic diseases among people living with HIV but also they learned that other drugs could interact with ARVs that could influence effects of ARVs or reduce the effectiveness of them. Similarly, they acquired the ability to make a differential diagnosis (the signs of certain pathologies being similar, it is necessary to be able to differentiate them and make an exact diagnosis).

"Then when we do the differential diagnosis it helped us a lot. Honestly, it helped me, because it was necessary to differentiate between diseases. There are diseases that are similar, but are not the same, and there's only [one] illness to be identified. You should know this is hepatitis or some other disease." (Nurse, FGD participant)

Moderator: "What is the most important thing that TeleECHO sessions bring to you?"

"You see, regarding disease diagnosis, the pharmacist is not at this level (the diagnosis). I'm learning more at this level through the ECHO project. I understood during the ECHO sessions that we should not systematically initiate ART to a person. When we talk about tests and treat at all, it is not because we have detected the HIV-positive client that we must immediately initiate an ARV without looking for any coinfection. For example, a person infected with TB should not get the same care as someone without TB, and TB treatment could have an interaction with the ARVs. For a person also hospitalized, they cannot be put directly on ARV, and you must first improve the health condition before initiation. In total, with much more practical cases it was a real gain that I had by participating in the TeleECHO sessions, They helped me so much while dispensing ARVs at GH Daoukro." (Pharmacist, IDI participant)

One of the participants explained that the training sessions allowed him to have knowledge of the different families of ARVs, the pharmacological activity, the types of actions of the molecules, and their degree of toxicity. This information allowed him to be more specific in the implementation of the new HIV care and treatment protocol, which recommends, for example, reducing the dose of efavirenz from 600 to 400 mg.

"Yes, ECHO sessions were useful for our daily practice. We learned the different families of antiretroviral drugs and then we saw also their pharmacological activities and their sites of action. It was really very interesting. Yes, there was information that has been of great use. We know that there are certain drugs that are toxic, for example, when we saw that the dose of efavirenz has been reduced from 600 mg to 400 mg." (Pharmacist, IDI participant)

According to providers, these nurses, through the ECHO training sessions, discovered the importance of the psychological aspect in the care of people living with HIV, and acquired the capacity to be able not

only to keep PLHIV in that care but also to communicate a child's HIV-positive test result to the child's caregivers.

"I would like to say that we needed a lot of information about the HIV activities that we were already doing, especially among children, such as the management of positive test results, and psychological issues, such as communication with the child's caregivers. [We learned] how to conduct a positive result announcement. Sometimes it was difficult to give the positive test results to the child's caregivers or his mother. Anyway, we needed to have more strategies and techniques to be able to announce the positive tests results. There were all these issues, and in addition there was the psychological care of the child and adolescents beyond 10 years. However, we still had information that helped us be able to lead the activity without trouble." (Nurse, FGD participant)

Impact on participants' practices

Regarding this component, all the participants attested that the knowledge acquired during the training sessions had been beneficial for their practice. Also, they stated to have integrated this new knowledge into their daily practices to improve the care of people living with HIV. Indeed, for one of the physicians, the recommendations made during the presentation of a clinical case on diarrhea reinforced his abilities to successfully treat a patient with similar problems. Following this lesson learned, he introduced on his site discussions around clinical cases, discussions that included all care staff at this facility.

"When the TeleECHO sessions started, and after presentation of the first topics related to diarrhea management among PLHIV, the team started meeting regularly to discuss and see together how to manage diarrhea among PLHIV. The fact that we saw each other all the time allowed us to have a small group and to see together how to deal with a case that you cannot control alone and that needs the involvement of other staff members. Each of the providers of this group could [voice] his concern and we could discuss it." (Physician, FGD participant)

In the same way, two nurses stated that the knowledge acquired during the TeleECHO trainings allowed them to adopt appropriate care practices toward patients. For example, one participant said she gained skills in managing HIV-infected patients who were experiencing difficulty breathing.

"I had cases where patients had been evacuated with breathing difficulties. Generally, when we see this kind of case, our first action is to inject to the patient with an antihistamine to leverage the breathing issues. But as every patient is tested for HIV after the counseling, and when I have a patient with an HIV-positive result and breathing issues, based on ECHO session training I let the doctor and other colleagues know that the patient is HIV-positive. Therefore, the use of antihistamine drugs is prohibited. It was during the ECHO project that I learned this, and it was very helpful for my medical practice." (Nurse, IDI participant)

For the remaining nurse, the ECHO sessions helped him to systematically test malnourished children for HIV before referring them to dietary services.

"Well, initially severely malnourished children were directly sent to the dietary service, or it was necessary for us to screen them [based on their] status of malnutrition. The ECHO sessions helped us a lot. And right now, we test all malnourished children for HIV before doing anything." (Nurse, FGD participant)

One of the pharmacists interviewed said that the presentation of a pediatric clinical case to TeleECHO has empowered him to adequately take care of a child living with HIV. He believes that, thanks to the ECHO session presentation, the HIV provider's team was able to prescribe adapted ART to the child, and therefore avoid kidney issues to this child.

"Yes, the last time we had a pediatrics case we asked to do some analysis before putting the patient on ARVT. With this patient, if we had not done these blood tests, we could have caused kidney failure to him. Thanks to this, we changed the medication and put the child under a correct treatment." (Pharmacist, IDI participant)

Overall, participants state that the ECHO project has benefited them. The sharing of experiences between providers from different sites, and the knowledge gained from discussions with the SMEs, have allowed them to improve their daily care practice in the area of HIV.

Impact on professional satisfaction

Participants generally are very satisfied with their participation in the ECHO project. This level of satisfaction can be seen through the scoring exercise (on a scale of one to five, to which they were subjected). At the end of this exercise, almost all of the participants gave the project a score of four out of five.

Also, their results show satisfaction with the fact that the presentations during the TeleECHO sessions provided them with useful and up-to-date knowledge. They were thus able to improve their professional skills and even the quality of care provided to their patients.

"I think a lot things have changed. Especially in terms of hygiene in our daily practice, we have improved a lot of things. Before we participated in the ECHO sessions we used to throw the test that was made to the patient directly in the dedicated garbage. But today, with these different formations though ECHO that we had, we decontaminate the tests first,1 before eliminating them. So that's a plus for the service, and we had to communicate it to all the providers in the hospital. Another added value is that before, when the result of the HIV test was undetermined, we gave appointments in three months to retest [a patient]. But since ECHO training we realized that we have to address the patient or the child in the lab for further testing." (Nurse, FGD participant)

Considering the advantages of the ECHO model, some participants even wanted the ECHO project to be extended to all the health districts and facilities. In addition, the training session of the project should be extended to other pathologies.

"As far as I'm concerned, the project arrived at the right time. The pilot phase went relatively well. So I think we have to reach a stage where we will democratize the use of this tool. That all!" (Pharmacist, IDI participant)

DISCUSSION AND RECOMMENDATIONS

Discussion

This report presents the first evaluation results in Cote d'Ivoire, or in French-speaking Africa, more broadly, of the ECHO distance learning model for expanding capacity among HIV providers. This report provides evidence of the acceptability and feasibility of implementation of the TeleECHO model. Specifically, results of this pre- and post-evaluation show statistically significant increases in HIV knowledge, perceived behavioral capability, and job satisfaction of HIV care providers. The study addressed the feasibility and acceptability of the ECHO model, and the challenges of its implementation in Côte d'Ivoire.

HEATH CARE WORKERS' PARTICIPATION IN THE ECHO PROJECT

Regarding the participation of health care providers in the ECHO model in Côte d'Ivoire, the analysis of the data showed that the providers participating in the TeleECHO sessions were predominantly nurses and physicians. This can be explained by the fact that health care provision, in general, and particularly HIV services, is mainly performed by physicians and nurses. Nurses and midwives have been involved in the management of HIV and related pathologies in Côte d'Ivoire after the national task-shifting guidelines were released in 2015.[10]

KNOWLEDGE, PERCEIVED BEHAVIORAL CAPABILITY, AND JOB SATISFACTION OF PROVIDERS

One of the issues often identified in health systems in developing countries is the need to improve health care provision. The ECHO initiative helps to fill this gap by bringing less-experienced providers and experts together through a mentoring system that ultimately should have a significant impact on the providers' knowledge of disease management.

After the pilot phase of ECHO in Côte d'Ivoire, it was noted that, despite the 6.5-year average of HIV experience among health care workers, the ECHO project augmented knowledge of HIV service provision. This improvement in knowledge was measured through a pre- and post-test. This change was observed both in perceived behavioral control and in job satisfaction of providers who participated in the ECHO model. Providers were satisfied with the didactic presentations and additional discussions during TeleECHO sessions, which provided them with useful and up-to-date knowledge on various HIV-related topics. Providers were able to improve their professional practices and the quality of care provided to their patients. In addition, most of the participants saw TeleECHO sessions as an opportunity to share their knowledge and learn more from colleagues. Similar results were observed in the evaluation of the ECHO project in Namibia[11] and also in New Mexico.[12]

FEASIBILITY AND ACCEPTABILITY OF TELEECHO IN CÔTE D'IVOIRE

The providers involved in the pilot phase were from diverse backgrounds, with initial and ongoing training in HIV care. The average experience with providing HIV care and treatment of TeleECHO participants was 6.5 years. There was good attendance at TeleECHO sessions, with an average attendance of 15 out of 25 sessions. A real motivation for providers to attend ECHO sessions was the need to gain new knowledge related to HIV case management. Attending ECHO sessions provided an opportunity to strengthen providers' existing knowledge gaps in HIV and other disease management protocols. Additionally, the project helped to reduce professional isolation and allowed participants to access health expertise in Côte d'Ivoire. With regard to training method preferences, most providers indicated the ECHO model as their preferred method of training. Those surveyed appreciated that the ECHO model brought colleagues together in one place where they could all interact. The majority of TeleECHO attendees said they would continue to join the ECHO sessions if the project were extended.

[10] PNLS, guidelines for HIV care and treatment and task-shifting
[11] ECHO Namibia Project Evaluation Report
[12] New Mexico Project ECHO Assessment

ZOOM TECHNOLOGY

Although all participants said that Zoom is an innovative technology, some challenges that could hinder its implementation should be taken into account. These include the lack of sufficiently trained staff for handling the materials used for the training, and the instability of the Internet connection.

Recommendations

The following recommendations were made to help improve further implementation of Project ECHO.

SUGGESTIONS TO IMPROVE TELEECHO SESSIONS

- Extend duration for ECHO sessions in order to provide participants with a realistic time frame that sessions will last.
- Use social media channels, such as Slack, Facebook, WhatsApp or Skype, to enhance communication about the sessions and to provide a platform for addressing unresolved concerns, clarifying questions, and sharing session materials.
- Allow participants to suggest training topics.
- Share the PowerPoint and reading materials related to the topics with participants before or after the session.
- Record sessions and allow participants who were absent during the TeleECHO sessions to view them later.
- Extend ECHO sessions to other pathologies and adapt the sessions to different health specialties.
- Send topics to participants well in advance to allow them to research the topic prior to the sessions, and therefore enrich discussions.
- Share sessions' passwords with participants so that they can access training sessions, regardless of their geographical position.
- Adapt the training language to the nurses and midwives so they can easily learn from subject matter experts.
- Introduce regular assessments and a form of competition between sites for participants to become familiar with the information received.
- Extend ECHO sessions to all health regions of Côte d'Ivoire.
- Improve Internet access and train participants in how to use the ECHO project technical materials (i.e., computers, cables, cameras, screens, WiFi).

SUGGESTIONS TO ENHANCE PARTICIPATION RATE

- Improve communication about Project ECHO so that all health personnel are aware and can participate.
- Sensitize providers on the benefits of ECHO by distributing the summaries of the sessions (especially the experts' recommendations).
- Involve health facility managers to encourage hospital staff to participate.
- Raise interest about Project ECHO through incentives and certificates of participation.
- Value frequent participants and sites with high-volume participation by providing rewards (such as certificates of excellence), and promote providers who completed ECHO sessions and who mentor others by sharing their experiences in the ECHO program as ECHO ambassadors.

- Provide coffee breaks to participants at the end of each session.

CONCLUSION

The evaluation of the implementation of the pilot ECHO project in Côte d'Ivoire demonstrated that the majority of the health care providers who participated in the TeleECHO sessions were satisfied with the sessions. Overall, the ECHO model is relevant for the country health system, because it builds the capacity of health care workers in an efficient way, using technological innovation.

In terms of impact, all participants certified that participation in the ECHO sessions allowed them to not only improve their level of knowledge but also their daily practices in caring for people living with HIV.

Although some difficulties exist that could hinder the implementation of the project, the participants believed that all health care providers, regardless of their position (cadres or not), should become involved in the ECHO sessions, in order to access useful and up-to-date information to improve the quality of services provided. To this end, participants expressed the need to equip each health district in Côte d'Ivoire with TeleECHO technology and programming.

In addition, in the national context of HIV control, as well as in the national context of other chronic diseases, this training approach could serve as a framework for exchanging best practices between health care providers for comprehensive care of people living with HIV or other patients, by using innovative and convincing approaches to increase knowledge and apply relevant guidelines, namely in the remote areas.

This could be done by integrating additional mentoring content and ongoing interactions, such as remote tutoring (through personalized synchronous sessions), and through group e-mails, forums, and FAQs, by module.

The main success of the project was high attendance at TeleECHO sessions, with real motivation from providers to attend the sessions and gain new knowledge related to HIV case management. In turn, providers increased their knowledge of HIV service provision and improved professional practices and the quality of care provided to patients, reduced professional isolation, and provided participants with expert health care. Building on these successes, as well as lessons learned, the following considerations and next steps should be contemplated:

- Consolidate the achievements of the pilot phase and continue, on a stronger dynamic and participatory basis, the extension of the ECHO initiative in progressive phases. The ongoing process under the CDC-funded Project Djasso fits well with this approach. Under Project Djasso, EGPAF will expand ECHO into 22 additional sites. See Appendix O for additional information on the expansion of Project ECHO in Côte d'Ivoire.
- Build the institutional framework for making the e-learning approach an efficient and preferential alternative for building in-service human resources capacity for a successful health system:
    - Strengthen the operational capacities of the central hub at the human and logistic level, with the possibility of decentralization (regional hubs).
    - Advocate for resource mobilization with governments and development partners.
    - Establish a "Certificate of Professional Competence" whose award procedures and academic correspondence must be defined in liaison with the relevant institutions.

To this end, a transition plan developed in collaboration with INSP is ongoing, with technical support from EGPAF.

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APPENDIX A: EVALUATION PLAN FOR PROJECT ECHO

GOALS OF EVALUATION	METHODS	METRICS
Determine feasibility and acceptability of ECHO model in Côte d'Ivoire	• Process evaluation – document inputs, activities and outputs • Focus groups with participants • Survey of mentors and clinic administrators	• No. of trainings, No. of cases presented, No. registered for ECHO, No. receiving log-in IDs, No. in each session, frequency and content of trainings • Focus group data • Feedback from mentors and administrators on impact on building skills, improving teamwork, and clinic
Measure the impact of ECHO on providers' knowledge, perceived behavioral capability and professional satisfaction	• Knowledge test questionnaires for providers • Perceived behavioral capability and satisfaction questionnaire for providers • TeleECHO session evaluations	• Knowledge pre- and post-test scores • Perceived behavioral capability and Professional satisfaction • Questionnaire pre- and post-test scores • Feedback from participants on quality; and • Content of trainings

APPENDIX B: CDI HIV TELEECHO ILLUSTRATIVE SESSION TOPICS

Topics	Suggested Learning Objectives
1. TEST AND TREAT ALL	1. Explain the "Test and Treat All" concept
	2. Identify priority targets for HIV testing
	3. Inform data collection tools
2. ADULT CARE AND TREATMENT	4. Prepare adults for ART
	5. Prescribe ART to adult PLHIV
	6. Ensure clinical and biological follow-up to adults on ART
	7. Manage therapeutic failures
	8. Manage adverse reactions to ART
	9. Inform data collection tools
3. CARE AND TREATMENT FOR CHILDREN AND ADOLESCENTS	10. Prepare children and adolescents for ART
	11. Prescribe first- and second-line antiretroviral (ARV) regimens to children and adolescents living with HIV
	12. Set out the basic principles for a transition from adolescence to adulthood for PLHIV in ART
	13. Set out the basic rules for reporting HIV status to children and adolescents (when and how)
	14. Clinical and biological follow-up to adolescent children under ART (failure management, adverse effects)
	15. Inform data collection tools
4. TREATMENT LITERACY AND ADHERENCE	16. Define treatment literacy and adherence to ART
	17. Identify factors that influence adherence to ART
	18. Evaluate adherence to ART
	19. Suggest strategies to improve adherence to ART
5. RETENTION IN CARE	20. Evaluate the retention of PLHIV in care
	21. Identify the factors that influence the retention of PLHIV in care (NB: Focus on the mother-child pair)

Topics	Suggested Learning Objectives
	22. Suggest strategies to improve retention
6. COINFECTION TB/HIV	23. Activate TB screening for PLHIV
	24. Treating tuberculosis in PLHIV
	25. Follow-up of TB/HIV coinfected patients
7. HIV/HBV COINFECTION	26. Screening for HBV in PLHIV
	27. Treating HIV/HBV coinfection
	28. Follow-up of HIV/HBV coinfected patients

APPENDIX C: CDI HIV TELEECHO PROVIDER HIV KNOWLEDGE PRE-TEST

1. "Test and Treat All" is an approach that aims to:
   a. Put a PLHIV on antiretroviral therapy (ART) with an eligibility condition and without delay.
   b. Only put a PLHIV on anti-retroviral therapy (ART) with CD4> 500 cells/mm^3.
   c. Only put a PLHIV on antiretroviral therapy (ART) without any conditions of eligibility for ART**.**
   d. Put a PLHIV on antiretroviral therapy (ART) without any conditions of eligibility and without delay (without waiting for the results of the eligibility screening).
   e. Don't know

2. The objective of Cote d'Ivoire's "Test and Treat All" policy is to:
   a. **Eliminate HIV infection**
   b. Reduce the occurrence of opportunistic HIV-related infections
   c. Ensure the early infant diagnosis of children born to HIV-positive mothers
   d. Don't know

3. Mr. Eric, a 27-year-old military conscript, came in for a consultation for fever, vomiting, and body aches. He was provided HIV counseling and testing. If his HIV test result is positive:

   i. Based on the concept of "Test and Treat All," choose the false answer:
   a. Enroll in care (give a unique ID number of support, open his individual client record)
   b. Carry out the eligibility screening to identify the eligibility criteria for ARV treatment
   c. Prepare for ART
   d. Prescribe ART
   e. Don't know

   ii. What is the data collection tool that does not need to be filled out?
   a. Delivery Register
   b. The individual client records
   c. ART Register
   d. Follow-up register for care and support
   e. Don't know

4. Identify those populations that are not priority targets for HIV testing (mark all that apply):
   a. Young girls aged 10–24
   b. People in uniform
   c. **Teachers**
   d. Sex workers
   e. **Health care workers**
   f. Drug users
   g. Patient with sexually transmitted infections (STIs)
   h. Patients infected with tuberculosis
   i. Don't know

5. The code for your site is 1245. For screening, you have the register 02 of the post 15. On March 12, 2015, you receive for consultation Mrs. KOSSO LIMA. She is 18 years old. This is her first visit to your site. Her husband is Mr. CALO. You offer her the HIV screening test and she agrees. You are doing the 60th screening test of the year that gives an HIV-negative result.

i) The code of the HIV screening is :
   a. 1245/15/02/060/2015

b. 2015/02/15/060/1245
c. 1245/02/15/2015/060
d. 2015/15/02/1245/060
e. Don't know

(ii) To record the result of the test in the screening register by the rapid tests:
a. Circle NR in column "Test 1" and NR in column "Test 2"
b. Circle only Neg in the column "final result given to the client"
c. Circle NR in column "Test 1" and Neg in column "final result given to client"
d. Circle NR in column "Test 3" and Neg in column "final result given to client"
e. Don't know

6. Prior to starting ART with a naïve adult positive for HIV-1, the health care worker (HCW) should inquire about (circle all that apply):
a. Medical background
b. The number of sexual partners
c. Taking patient concerns into account
d. Calculate the BMI
e. Give him a watch
f. Don't know

7. Patient preparation for ART in the "Test and Treat All" strategy is mandatory.
a. True
b. False
c. Don't know

8. The first-line ARV therapeutic regimen for naïve HIV-1-positive subject is (circle one correct answer):
a. TDF + 3TC + NVP
b. ABC + 3TC+ LPV/r
c. AZT + 3TC + ATV/r
d. TDF + 3TC + EFV
e. Don't know

9. In the first-line ARV therapeutic regimen for a naïve HIV-1 subject, if the patient has efavirenz intolerance or if severe neuropsychiatric disorders (hallucination and psychosis) due to efavirenz appears, this drug is replaced by nevirapine.
a. True
b. False
c. Don't know

10. The ART second-line regimen includes two nucleoside reverse transcriptase inhibitors (NRTIs) and one protease inhibitor (PI).
a. True
b. False
c. Don't know

11. The HIV RNA test follow-up for a stable adult patient on ART is conducted every:
a. Three months
b. Six months
c. 12 months
d. 24 months
e. Don't know

12. The biological test for early detection of therapeutic failure is (circle the correct answer):
    a. CD4 rate
    b. Viral load
    c. Creatininemia
    d. Hemoglobin
    e. Don't know

13. An adult woman patient on ART for at least 12 months is classified as "non-stable" if (circle the correct answer):
    a. She has one (1) measure of viral load more than 1000 copies/mL
    b. She has no manifestation of opportunistic affection
    c. There are no treatment-related adverse reactions
    d. She is not pregnant and does not breastfeed a child
    e. Don't know

14. During the management of a stable adult patient taking ARV drugs clinical follow-up will be carried out:
    a. Every three months
    b. **Every six months**
    c. Every 12 months
    d. Every 24 months
    e. Don't know

15. In Côte d'Ivoire, which test(s) is/are used for the biological follow-up of a patient infected with HIV-2:
    a. CD4
    b. CD4+VL
    c. VL
    d. Hemoglobin
    e. Don't know

16. An adult patient taking TDF + 3TC + EFV with good ARV adherence had an HIV viral load after twelve (12) months of treatment of 12,000 copies/mL. You conducted a careful assessment of barriers to adherence, provided guidance for intensive adherence, and treatment support for three months.

(i) You order a VL for the second time. The VL performed is 10,000 copies/mL Is it:
    a. An ART-related adverse event
    b. **Virological failure**
    c. An immune reconstitution inflammatory syndrome
    d. Don't know

(ii) What is the next most appropriate step?
    a. Verify the CD4 count and the HIV genotype
    b. **Change ART to a second-line regimen**
    c. Stop ARVs and check HIV drug resistance within six months
    d. Encourage adherence and verify HIV viral load after six months
    e. Don't know

17. Which of the following ARVs has renal toxicity?
    a) TDF
    b) AZT
    c) 3TC
    d) EFV
    e) Don't know

18. Faced with a patient on first-line ARV treatment with TDF + 3TC + EFV who has jaundice at one month of treatment with transaminases > three times the upper limit of normal, what will you do?
    a. Continue ART
    b. Stop EFV for two weeks
    c. Stop all ART
    d. Replace EFV permanently with the LPV/r
    e. Don't know

19. The following tools must be completed each time the PLHIV visits the site (circle all that apply):
    a) ART Register
    b) Individual client record
    c) Chronic Care Register
    d) Don't know

20. For HIV-positive pregnant or breastfeeding mothers, what is the specific tool to be filled out?
    a) **Prevention of mother-to-child transmission (PMTCT) mother-child pair follow-up register**
    b) Antenatal clinic register
    c) Delivery register
    d) Don't know

21. Of the following information, only one is not to be collected for the choice of ARV treatment for a naïve HIV-1-positive child. Which?
    a. Diet
    b. Medical background
    c. The ability to swallow tablets
    d. Identification of the adult who will give ART
    e. Weight and height of child
    f. Don't know

22. Putting an adolescent on ART requires the consent:
    a. Of the parent (s)
    b. Of the adolescent
    c. Of the parent and the adolescent
    d. Of teachers
    e. Don't know

23. Tenofovir-based ARV regimens may be prescribed for children weighing more than or equal to:
    a) 25 kg ?
    b) 35 kg ?
    c) 45 kg ?
    d) 65 kg ?
    e) Don't know

24. The first-line ARV therapeutic regimen for a six-month-old naïve HIV-1 positive child is (circle the correct answer):
    a. ABC + 3TC+ LPV/r
    b. ABC+3TC+NVP
    c. TDF+3TC+EFV
    d. TDF+3TC+LPV/r
    e. Don't know

25. To choose ART for a seven-year-old child we need to take into account the CD4 count.
    a. True

b. False
c. Don't know

26. Cotrimoxazole prophylaxis is routine for a child living with HIV:
    a. up to the age of one year
    b. up to the age of five
    c. up to the age of 10
    d. up to the age of 15
    e. Don't know

27. In the management of care for a 13-year-old HIV-positive child at your site, his ART transition plan to adult care should include which of the following options?
    a. Confirm his understanding of HIV diagnosis and treatment and provide appropriate counseling
    b. Inform him that condoms are not needed with sexual activity as long as he is on ART
    c. Wait until he goes to the adult clinic before revealing his HIV status
    d. Wait until he goes to adult clinical care before giving him the responsibility for taking his medication
    e. Don't know

28. The HIV disclosure process should:
    a. start when a child reaches the age of 12
    b. Start only when the child is on ART
    c. **Start at the age of seven**
    d. Be delayed until the child is sexually active
    e. Don't know

29. The partial disclosure to a child means:
    a. Share only with certain family members the serological status of a child
    b. Explain to a child that the medications they are taking are for a condition other than HIV
    c. Allow a child to hear from others about HIV status
    d. Explain the child's HIV status according to psychological maturity
    e. Don't know

30. The biological follow-up of a child >35 kg on TDF/3TC/EFV does not include one of the following biological exams:
    a. CD4 + VL
    b. Uraemia
    c. Creatininemia + Glycaemia
    d. Hemoglobin
    e. Don't know

31. How often is VL performed for a child stable on ART?
    a. Every three months
    b. **Every six months**
    c. Every 12 months
    d. Every 24 months
    e. Don't know

32. How often is clinical follow-up performed for a non-stable child under ART?
    a. **Each month**
    b. Every three months
    c. Every six months
    d. Every 12 months
    e. Don't know

33. According to national guidelines, what is the value of the viral load defining treatment failure for a child over three years of age:
    a) >100 Copies/mL
    b) >1 000 Copies/mL
    c) >10 000 Copies/mL
    d) >100 000 Copies/mL
    e) Don't know

34. Which of the following tools is not to be systematically filled out at each clinical visit of a PLHIV?
    a. ART Register
    b. Individual patient record
    c. Chronic care record
    d. Cohort analysis report
    e. Don't know

35. Treatment compliance is the ability of a person to take a prescribed treatment.
    a. True
    b. False
    c. Don't know

36. Which of the following statements is not correct? Therapeutic education allows:
    a. The learning of the patient and his entourage for good adherence to the prescribed treatment.
    b. The avoidance of treatment-related adverse events.
    c. The acquisition of skills to heal and adapt to the illness.
    d. **The prevention of complications related to the evolution of his disease**.
    e. Don't know

37. Which of the following best describes adherence to antiretroviral therapy (ART)?
    a. Adherence should only be considered when the patient begins a new ARV drug regimen.
    b. The patient's willingness to start ARVs has little impact on adherence.
    c. Good adherence to ART prevents the development of viral resistance and reduces the risk of HIV transmission
    d. Socioeconomic status and level of education are good factors for adherence
    e. Don't know

38. What factors influence adherence to antiretroviral therapy?
    a. Work schedule
    b. Poverty (lack of food)
    c. Adverse drug reactions
    d. All answers are correct
    e. Don't know

39. What are the elements of adherence assessment?
    a. Viral load
    b. CD4
    c. Repeated opportunistic infections
    d. All answers are true
    e. Don't know

40. Which strategies to improve adherence to ART are not good?
    a. Mobile phone rings at ARV time
    b. The community counselor must call the patient each time (at the time the drug must be taken)

c. The patient must mark the hours of ARVs in his diary
d. No answers are accurate
e. Don't know

41. In January 2016, the Urban Health Center of GOGOUA recently placed 10 PLHIV on ART. As of January 31, 2017, two died, one was transferred to the CHR of the region, and two were lost to follow-up. In addition, three people on ART were transferred in from another health center to the GOGOUA Urban Health Center on January 20, 2016. The retention rate of the GOGOUA Urban Health Center at the end of January 2017 is:
    a. 80,7 %
    b. 66,7%
    c. 45,7%
    d. No answer
    e. Don't know

42. The assessment of retention on ART in a health facility allows the:
    a. **Determination of the capacity of the site to maintain PLHIV in the health care system on ART**
    b. Determination of the ability of PLHIV to stay in the health care system on ART
    c. Search for lost to follow up PLHIVs
    d. Strengthening of the provision of HIV-testing services
    e. Set up of a PLHIV support network
    f. Don't know

43. The factors that negatively affect the retention of PLHIV in care are:
    a. Insufficient information about HIV/AIDS and treatment
    b. Lack of preparation for taking ARVs
    c. Side effects of ARVs
    d. All answers are correct
    e. Don't know

44. One of the following factors does not negatively affect the retention of the mother-child pair into care:
    a. ARV stock outs
    b. The low involvement of partners and spouses in Maternal, Neonatal and Infant Health (MNCH)
    c. **The existence of nutritional support activities**
    d. The lack of appointment management tools
    e. Don't know

45. The urban health center of BIA has an active roster of 100 PLHIV. The balance sheet at the end of the month shows that 25 people did not come to the appointment for the renewal of their treatment. Interviews with clients who have missed their appointments revealed the poor reception by the health care workers and the long waiting times. Check the intervention that can be suggested to improve retention of patients in care:
    a. **Improve the reception and the patients' flow, taking into account the reason for the visit**
    b. Offer free products and laboratory testing
    c. Improve the availability of ARVs
    d. Set up a PLHIV support group network
    e. Don't know

46. A 34-year-old PLHIV attends a follow-up visit. He complains of a cough evolving over the past three weeks and the clinical examination reveals an oral candidiasis. Which of the statements is right?
    a. TB diagnostic work-up is required in this patient because of a cough that has been evolving for more than two weeks.
    b. Treatment of candidiasis will resolve the cough.
    c. The search for signs of tubercular infection should be carried out in this patient and at all other follow-up visits.

d. Cough treatment will suffice for this patient.
e. Don't know.

47. During a routine visit, looking for signs of TB infection is mandatory. During the follow-up visit, the TB screening is mandatory.
    a. **True**
    b. False
    c. Don't know

48. A 27-year-old patient newly diagnosed HIV-positive has a cough, fever, and night sweats. The examination of the sputum revealed TB bacillus (BAAR). She has a history of severe neuropsychiatric disorders. Which of the statements is false?
    a. Initiate antiretroviral therapy during tuberculosis treatment for any form of tuberculosis, regardless of CD4 cell count
    b. Prescribe for HIV treatment the combination AZT + 3TC + TDF
    c. Initiate antiretroviral therapy two weeks after the initiation of anti-tuberculosis treatment.
    d. Prescribe for HIV treatment the combination TDF + 3TC + EFV
    e. Don't know

49. Cotrimoxazole is part of the minimum package of care to be administered to the TB/HIV coinfected patient.
    a. **True**
    b. False
    c. Don't know

50. For children under three years of age coinfected with TB/HIV, which of the following therapeutic combinations is correct?
    a) ABC+3TC+EFV
    b) AZT+3TC+ABC
    c) TDF+3TC+EFV
    d) ABC+3TC+LPV/r
    e) Don't know

51. The clinical and biological follow-up of a coinfected TB/HIV patient is different from that of an HIV-infected patient with no other infection.
    a. True
    b. **False**
    c. Don't know

52. How often is TB screening performed for a stable patient?
    a. Every three months
    b. **Every six months**
    c. Every 12 months
    d. Every 18 months
    e. Don't know

53. Is screening for viral hepatitis B mandatory for PLHIV under the preferential TDF/3TC/EFV regimen?
    a. True
    b. **False**
    c. Don't know

54. Hepatitis B screening is not indicated in one of the populations below. Which one?
    a. Pregnant woman with no infection

b. **Children under 10 years of age**
c. Adults without infection
d. Non-stable HIV-positive patients with no infection
e. Don't know

55. A 35-year-old HIV-positive male patient has a CD4 count of 785 cells/mm^3 and is HBsAg-positive. He is healthy and his creatinine clearance (CrCL) is 55 mL/min., with traces of protein in the urine. Which of the following statements is not correct?
    a. He is eligible for ART even if he has a current HBV infection
    b. The preferred ARV regimen for this patient is TDF/FTC/EFV
    c. The preferred ARV regimen for this patient is AZT/3TC/EFV
    d. This patient necessarily needs a re-evaluation of his renal status during his follow-up visits.
    e. Don't know

56. Which of the following ARVs has anti-viral properties against hepatitis B virus?
    a. Nevirapine
    b. Tenofovir
    c. Zidovudine
    d. Efavirenz
    e. Don't know

57. The clinical and biological follow-up of the HIV/HBV coinfected patient on a TDF-containing regimen is identical to that of the other HIV patients.
    a. **True**
    b. False
    c. Don't know

58. During follow-up of an HIV/HBV coinfected patient, the assessment shows a CD4 cell count of 85 cells/mm^3 and ALT> three times the upper limit of normal. What should be the ARV treatment regimen for this patient?
    a. TDF+3TC+EFV
    b. TDF+3TC+LPV/r
    c. TDF+3TC+AZT
    d. AZT+3TC+EFV
    e. Don't know

APPENDIX D: FOCUS GROUP AND INTERVIEW GUIDE FOR HIV ECHO CLINICAL PROVIDERS

The following demographic and background information will be collected for each participant:

1. ECHO ID Number: ☐☐☐☐☐☐
2. Gender: 1.☐ Male 2.☐ Female
3. Age:
   [ ] 18–25
   [ ] 26–35
   [ ] 36–45
   [ ] 46–55
   [ ] >55
4. Region:_____District:_____
5. Are you working in an HIV Outpatient Clinic?
   [ ] Yes
   [ ] No
6. Where is the clinic situated?
   [ ] Intermediate Hospital
   [ ] District Hospital
   [ ] Health Center
   [ ] Other: _____
7. What kind of diploma do you have? (Check all that apply.)
   [ ] Doctor
   [ ] Pharmacist
   [ ] Pharmacist's assistant
   [ ] Nurse
   [ ] Midwife
   [ ] Bachelor in public health
   [ ] Other:_____
8. Where did you get your HIV education? (Check all that apply.)
   [ ] Medical university or nursing college
   [ ] In-service training courses
   [ ] Distance learning courses (e.g., University of Washington (UW) HIV management course, UW Principles of Sexually Transmitted Disease/HIV course)
   [ ] Online courses
   [ ] HIV clinical mentor
   [ ] Other:_____

9. How many years of experience do you have taking care of HIV patients? (Round to nearest whole number.) _____

10. On average, how many HIV patients do you take care of per week? ___

Focus group questions

1. There have been approximately 25 ECHO sessions so far in Côte d'Ivoire. How many have you had the opportunity to attend?

2. Why do you participate in this HIV-specific clinician Project ECHO?

3. Please think about the case-scenario presentations by clinicians (the ones you presented and ones presented by your peers).
   a. How well do the discussions and recommendations on the case-scenarios address your learning needs?
   b. In what ways do you use what you have learned from the case-scenarios?
   c. What could be improved in case-scenario presentations and discussions?
4. Please think about the short didactics (lecture portions) included in the weekly sessions.
   a. How well do the didactic sessions address your learning needs?
   b. In what ways do you use what you learned from the didactic sessions?
   c. What could be improved in the didactic sessions?
5. To what degree are you able to apply concepts presented in Project ECHO clinics to patients with similar problems in your practice?

6. Much of medicine involves a team of caregivers involved in the care of patients.

   a. Please comment on the participation of others on your clinical team in the ECHO clinic in which you participate.
   b. Are there ways for you to share the information from the ECHO clinic with others on your team or on the clinical staff?
   c. Please describe what facilitates or what inhibits sharing information and practices from Project ECHO at your site.
   d. Should every provider in your clinic be part of ECHO?
      If yes, how would you help ensure that everyone in your clinic takes part in ECHO?

7. How do you prefer to learn and share information? Through ECHO or in person?

   Rephrased: What do you see as advantages or disadvantages of ECHO sessions versus workshops?

   a. Please explain your preference for either method
8. Can you comment on the Zoom technology so far (e.g., Internet, speakers, screens, and utility)?
9. Do you have any additional comments or suggestions?

APPENDIX E: TELEECHO FOCUS GROUP WRITTEN INFORMED CONSENT FORM

PART I: Information Sheet

Introduction
The Côte d'Ivoire Project ECHO® Consortium is led by the Ministry of Health and Public Hygiene in partnership with the Centers for Disease Control (CDC) Côte d'Ivoire, CDC Atlanta, the Elizabeth Glaser Pediatric AIDS Foundation, and the University of New Mexico in the United States. CDC is the main sponsor of Project ECHO in Cote d'Ivoire. The Côte d'Ivoire Project ECHO Consortium is conducting an evaluation of the practical impact that TeleECHO sessions have on the providers' clinical practice and information sharing. You are being asked to take part in this focus group because you regularly attend TeleECHO sessions.

What will happen if I decide to take part?
If you agree to take part, you will attend a video-conference focus group conducted by a Project ECHO® focus group facilitator. The focus group attendees will include ECHO staff to facilitate and record information during the focus group, as well as other TeleECHO providers whom you may or may not know. There will be four to six providers in each focus group. We plan to conduct three or four focus groups across all of our ECHO sites. You will be asked about your opinion of ECHO sessions and how you use what you learn from them. Focus groups may last up to 90 minutes.

What are the risks or side effects of being in this focus group?
There are minimal risks of discomfort when answering questions and possible loss of privacy and confidentiality associated with taking part in a focus group. There is no way to protect privacy from others taking part in the focus group, but everyone taking part will be asked to maintain confidentiality. Discussions about sensitive personal information will be discouraged. Those taking part will be scheduled so that no person in the focus group reports professionally to any other.

What are the benefits to being in this focus group?
By taking part in a focus group, you will be helping to determine the practical impact of the TeleECHO sessions, which may be shared with other sites that are also interested in joining ECHO.

How will my information be kept confidential?
There is no way to protect privacy from others taking part in the focus group, but everyone taking part will be asked to maintain confidentiality. Focus group conversations will be digitally recorded and partially transcribed, with names removed from transcriptions. Digital recordings and transcriptions will remain in a locked, secure location within the Project ECHO® office. Audio and video recordings will be deleted and destroyed immediately after transcription and validation. Information obtained from focus groups is used to inform program improvements and will be de-identified. Your name will not be used in any published reports about this evaluation. You may keep a copy of this consent form.

Can I stop being in the focus group once I begin?
Your taking part is completely voluntary. You have the right to choose not to take part or to stop taking part at any point during this focus group without affecting your future ability to take part in Project ECHO®. Your employment or post assignment will not be affected by your decision to take part or not to take part in this focus group.

Whom can I call with questions or complaints about this focus group?
If you have any questions about your taking part in research at any time, YAVO William, PharmD, PhD, will be glad to answer them at Tel. +225 02 68 30 00 / +225 22 50 56 29 or yavowilliam@yahoo.fr. If you would like to speak with someone other than the Project ECHO team, you may call ATTIAH G. Joseph, MD/MPH, at Tel: +225 06 34 11 69 / +225 22 414 505 or jattiah@pedaids.org

PART II: Certificate of Consent

I have read the foregoing information, or it has been read to me. I have had the opportunity to ask questions about it and any questions that I have asked have been answered to my satisfaction. I consent voluntarily to take part in this evaluation.

Print Name of Participant: _____

Signature of Participant: _____

Date: _____

Day/month/year

Statement by the researcher/person taking consent

I have accurately read out the information sheet to the potential participant, and to the best of my ability made sure that the participant understands. I confirm that the participant was given an opportunity to ask questions about the study, and all the questions asked by the participant have been answered correctly and to the best of my ability. I confirm that the individual has not been coerced into giving consent, and the consent has been given freely and voluntarily. A copy of this ICF has been provided to the participant.

Print name of researcher/person taking the consent_____

Signature of researcher /person taking the consent_____

Date _____
Day/month/year

APPENDIX F: TELEECHO IN-DEPTH INTERVIEW (IDI) CONSENT FORM

PART I: Information Sheet

Introduction
The Côte d'Ivoire Project ECHO® Consortium is led by the Ministry of Health and Public Hygiene in partnership with the Centers for Disease Control (CDC) Côte d'Ivoire, CDC Atlanta, the Elizabeth Glaser Pediatric AIDS Foundation, and the University of New Mexico in the United States. CDC is the main sponsor of Project ECHO in Cote d'Ivoire. The Côte d'Ivoire Project ECHO Consortium is conducting an evaluation of the practical impact that TeleECHO sessions have on the providers' clinical practice and information sharing. You are being asked to take part in this interview because you regularly attend TeleECHO sessions.

What will happen if I decide to take part?
If you agree to take part, you will attend a video-conference interview, conducted by a Project ECHO® staff member. There may be other ECHO staff members present to take notes during the interview. Interviews may last up to one hour. Your answers will be recorded using an audio recorder. We plan to interview five to six participants like you across the ECHO sites.

What are the risks or side effects of being interviewed?
There are minimal risks of discomfort when answering questions. Discussions about sensitive personal information will be discouraged.

What are the benefits to being interviewed?
By participating in an interview, you will be helping to determine the practical impact of the TeleECHO sessions that may be shared with other sites that are interested in joining ECHO.

How will my information be kept confidential?
Interviews will be digitally recorded and partially transcribed, with names removed from transcriptions. Digital recordings and transcriptions will remain in a locked, secure location within the Project ECHO® office until they are destroyed at study completion. The link will be destroyed after data analysis is completed. In addition, the study documentation, including data, will be destroyed five years after total completion of the study.

Information obtained from interviews is used to inform program improvements and will be de-identified. Your name will not be used in any published reports about this evaluation. You may keep a copy of this consent form.

Can I stop the interview once I begin?
Your participation is completely voluntary. You have the right to choose not to participate or to withdraw your participation at any point during this interview without affecting your future participation in Project ECHO®. Your employment or post assignment will not be affected by your decision to participate or not participate in this interview.

Whom can I call with questions or complaints about this interview?
If you have any questions about your taking part in research at any time, YAVO William, PharmD, PhD, will be glad to answer them at Tel. +225 02 68 30 00 / +225 22 50 56 29 or yavowilliam@yahoo.fr. If you would like to

speak with someone other than the Project ECHO team, you may call ATTIAH G. Joseph, MD/MPH, at Tel: +225 06 34 11 69 / +225 22 414 505 or jattiah@pedaids.org

PART II: Certificate of Consent

I have read the foregoing information, or it has been read to me. I have had the opportunity to ask questions about it and any questions that I have asked have been answered to my satisfaction. I consent voluntarily to take part in this evaluation.

Print name of participant: _____

Signature of participant: _____

Date: _____

Day/month/year

Statement by the researcher/person taking consent

I have accurately read out the information sheet to the potential participant, and to the best of my ability made sure that the participant understands. I confirm that the participant was given an opportunity to ask questions about the study, and all the questions asked by the participant have been answered correctly and to the best of my ability. I confirm that the individual has not been coerced into giving consent, and the consent has been given freely and voluntarily. A copy of this consent form has been provided to the participant.

Print name of researcher/person taking the consent_____

Signature of researcher /person taking the consent_____

Date _____

Day/month/year

APPENDIX G: WRITTEN INFORMED CONSENT FOR SURVEYS AND QUESTIONNAIRES FOR PARTICIPATING PROVIDERS IN PILOT PROJECT ECHO IN CÔTE D'IVOIRE

PART I: Information Sheet

Introduction
The Côte d'Ivoire Project ECHO® Consortium is led by the Ministry of Health and Public Hygiene in partnership with the Centers for Disease Control (CDC) Côte d'Ivoire, CDC Atlanta, the Elizabeth Glaser Pediatric AIDS Foundation, and the University of New Mexico in the United States . CDC is the main sponsor of Project ECHO in Cote d'Ivoire. The Côte d'Ivoire Project ECHO Consortium is conducting an evaluation of the practical impact that TeleECHO sessions have on the providers' clinical practice and information sharing. You are being asked to take part in this evaluation because you regularly attend TeleECHO sessions.

What will happen if I decide to take part?
If you participate, you will be asked to complete questionnaires and surveys about TeleECHO® sessions. You may be asked to answer a set of questionnaires at the beginning of the pilot, before the first TeleECHO session. You may be asked to complete surveys again at the end of the pilot program. The questionnaire and surveys will help us know how much you have learned from the TeleECHO sessions, your opinions of the TeleECHO sessions, and ways to improve the TeleECHO sessions. The set of surveys will take about 45 minutes to complete. We plan to invite a total number of 30–42 participants in the ECHO sessions to respond to the questionnaire.

Must I participate?
Your involvement in the evaluation is voluntary, and you may choose not to participate. You may choose to complete one, some, all, or none of the questionnaires or surveys. If you do not want to do a questionnaire or survey, it will not affect your job, now or in the future.

How will my information be kept confidential?
To protect your privacy, you will be assigned a unique number that will link your responses to your name. To keep your answers confidential, names associated with the unique numbers are stored separately from the hard copy surveys in a secure Côte d'Ivoire Project ECHO® location, with access limited to Project ECHO® staff. The responses are securely stored as data that is encrypted and protected with passwords on secure servers. Data will be grouped together before being reported, and will not reveal the identity of participants. All data will be kept in a locked file in the locked office of Project ECHO staff or in a secured database on password-protected MSHP and CDC servers until the study results are analyzed and results completed. The link will be destroyed after data analysis is completed. In addition, the study documentation, including data, will be destroyed five years after total completion of the study.

What are the risks of participating?
There are no known risks in this evaluation, but some participants may feel uncomfortable answering questions. The findings from this evaluation will help inform improvements in the training and mentorship for HIV providers in Côte d'Ivoire. If published, results will be presented in summary form only.

Can I stop participating once I begin?

Your taking part is completely voluntary. You have the right to choose not to take part or to stop taking part at any point during these surveys and questionnaires without affecting your future ability to take part in Project ECHO®. Your employment or post assignment will not be affected by your decision to take part or not to take part in this evaluation.

Whom can I call with questions or complaints about this focus group?
If you have any questions about your taking part in research at any time, YAVO William, PharmD, PhD, will be glad to answer them at Tel. +225 02 68 30 00 / +225 22 50 56 29 or yavowilliam@yahoo.fr. If you would like to speak with someone other than the Project ECHO team, you may call ATTIAH G. Joseph, MD/MPH, at Tel: +225 06 34 11 69 / +225 22 414 505 or jattiah@pedaids.org

PART II: Certificate of Consent

I have read the foregoing information, or it has been read to me. I have had the opportunity to ask questions about it and any questions that I have asked have been answered to my satisfaction. I consent voluntarily to take part in this evaluation.

Print name of participant: _____

Signature of participant: _____

Date: _____

Day/month/year

Statement by the researcher/person taking consent

I have accurately read out the information sheet to the potential participant, and to the best of my ability made sure that the participant understands. I confirm that the participant was given an opportunity to ask questions about the study, and all the questions asked by the participant have been answered correctly and to the best of my ability. I confirm that the individual has not been coerced into giving consent, and the consent has been given freely and voluntarily. A copy of this ICF has been provided to the participant.

Print Name of researcher/person taking the consent_____

Signature of researcher /person taking the consent_____

Date _____

Day/month/year

APPENDIX H: CÔTE D'IVOIRE PROJECT ECHO EVALUATION PROVIDER PERCEIVED BEHAVIORAL CAPABILITY BASELINE SURVEY

Date (dd/mm/yyyy): _____/_____/_ _____

P**lease answer the following questions about yourself.**

1. Year of birth: ……..
2. Gender: 1.☐ Male 2.☐ Female
3. ECHO ID Number : ☐☐☐☐☐☐
4. Region:_____District:_____
5. Are you working in an HIV outpatient clinic?
   [ ] Yes
   [ ] No
6. Where is the clinic situated?
   [ ] Intermediate hospital
   [ ] District hospital
   [ ] Health center
   [ ] Other: _____
7. What kind of diploma do you have? (Check all that apply.)
   [ ] Doctor
   [ ] Pharmacist
   [ ] Pharmacist's assistant
   [ ] Nurse
   [ ] Midwife
   [ ] Bachelor in public health
   [ ] Other:_____
8. Where did you get your HIV education? (Check all that apply.)
   [ ] Medical university or nursing college
   [ ] In-service training courses
   [ ] Distance learning courses (e.g., University of Washington (UW) HIV management course, UW Principles of Sexually Transmitted Diseases/HIV course)
   [ ] Online courses
   [ ] HIV clinical mentor
   [ ] Other:_____
9. How many years of experience do you have taking care of HIV patients? (Round to nearest whole number.)
   _____

10. On average, how many HIV patients do you take care of per week? _____

Please answer the following information technology-related (IT) questions.

11. Do you have a personal computer/laptop?
    [ ] Yes, computer
    [ ] Yes, laptop
    [ ] No

12. Do you have a smartphone or tablet?
    [ ] Yes
    [ ] No

13. At your clinic, do you have the following facilities? (**Check all available equipment**):
    [ ] Computer
    [ ] Webcam
    [ ] Microphone
    [ ] Computer speakers
    [ ] Internet connection
    [ ] Projector

14. How would you rate your computer literacy?
    [ ] Never used a computer before
    [ ] Beginner or new computer user
    [ ] Average user
    [ ] Above average user
    [ ] Advanced user

15. Do you check your e-mail regularly?
    [ ] Yes
    [ ] No

16. Have you ever participated in an online or distance learning course?
    [ ] Yes
    [ ] No

Please report how much you agree or disagree with each of the statements below.

	Strongly Disagree	**Disagree**	**Neutral**	**Agree**	**Strongly Agree**
17. When I need clinical support or assistance I have timely access to an HIV expert	☐	☐	☐	☐	☐
18. I have an opportunity to share clinical experience with my colleagues on a regular basis	☐	☐	☐	☐	☐

Please rate your competence in each area of HIV care and treatment according to the following scale:

1. = none or no skill at all
2. = vague knowledge, skills or competence
3. = slight knowledge, skills or competence
4. = average among my peers
5. = competent
6. = very competent
7. = expert, teach others

19. Ability to provide prophylaxis, diagnose, and manage common opportunistic infections (OIs) for adults and adolescents	1	2	3	4	5	6	7
20. Ability to provide prophylaxis, diagnose, and manage common opportunistic infections in children	1	2	3	4	5	6	7
21. Ability to determine eligibility for ART in adults, adolescents, and children	1	2	3	4	5	6	7
22. Ability to counsel pregnant women for ART (PMTCT)	1	2	3	4	5	6	7
23. Ability to provide and interpret early infant diagnosis and management of infants perinatally exposed to HIV	1	2	3	4	5	6	7
24. Ability to prescribe first-line ARV regimens for all patients	1	2	3	4	5	6	7
25. Ability to recognize and manage side effects of ARV medicines for all patients	1	2	3	4	5	6	7
26. Ability to diagnose and manage treatment failure in adults and adolescents, including prescribing second-line regimens	1	2	3	4	5	6	7
27. Ability to diagnose and manage treatment failure in children, including prescribing second-line regimens	1	2	3	4	5	6	7
28. Ability to interpret the results of viral load testing for all patients	1	2	3	4	5	6	7
29. Ability to manage tuberculosis coinfection in HIV-infected adults	1	2	3	4	5	6	7
30. Ability to manage tuberculosis coinfection in HIV-infected children	1	2	3	4	5	6	7
31. Ability to counsel discordant couples in birth control, STIs, and conception issues	1	2	3	4	5	6	7
32. Ability to guide caregivers through the HIV disclosure process leading to successful HIV status disclosure to children.	1	2	3	4	5	6	7
33. Ability to counsel adolescents in their transition from pediatric to adult care and treatment	1	2	3	4	5	6	7
34. Ability to serve as the HIV expert in your district/region	1	2	3	4	5	6	7

35. Overall, are you satisfied with your job?

[ ] Not satisfied at all
[ ] Not satisfied
[ ] Somewhat satisfied
[ ] Satisfied
[ ] Very satisfied

Please answer the following questions related to quality improvement (QI) activities:

36. Is your clinic participating in any quality improvement activities?

[ ] Yes

[ ] No

Please report how much you agree or disagree with each of the statements below:

	Strongly disagree	Disagree	Neutral	Agree	Strongly Agree
37. When I need support with implementing QI projects I have timely access to a QI coach	☐	☐	☐	☐	☐
38. I have an opportunity to share QI successes with my colleagues on a regular basis	☐	☐	☐	☐	☐

Please rate your competence in each area of quality improvement according to the following scale:

1. = none or no skill at all
2. = vague knowledge, skills or competence
3. = slight knowledge, skills or competence
4. = average among my peers
5. = competent
6. = very competent
7. = expert, teach others

39. Ability to measure quality in your clinic (performance measure)	1	2	3	4	5	6	7
40. Ability to understand performance measurement results	1	2	3	4	5	6	7
41. Ability to determine the cause of a gap in quality (determine the root cause of a quality problem)	1	2	3	4	5	6	7
42. Ability to design a plan to improve a quality problem	1	2	3	4	5	6	7
43. Ability to implement and monitor a QI plan	1	2	3	4	5	6	7
44. Ability to make change and improve the overall quality of care in your clinic	1	2	3	4	5	6	7
45. Ability to coach others to improve quality	1	2	3	4	5	6	7
46. Ability to serve as a QI expert in your district/region	1	2	3	4	5	6	7

47. How confident are you that you can help to improve the quality of services in your facility?

[ ] Very confident

[ ] Confident

[ ] Somewhat confident

[ ] Not very confident

[ ] Not confident at all

APPENDIX I: CÔTE D'IVOIRE PROJECT ECHO EVALUATION PROVIDER FOLLOW-UP SURVEY

Date (dd/mm/yyyy): _____/_____/_ _____

1. Please enter your ECHO project ID number: ☐☐☐☐☐☐

2. Which of the following Project ECHO sessions did you join and in which did you present a case?

	Date	Session topic	Joined?	Presented a case?
2.1			☐	☐
2.2			☐	☐
2.3			☐	☐
2.4			☐	☐
2.5			☐	☐
2.6			☐	☐
2.7			☐	☐
2.8			☐	☐
2.9			☐	☐
2.10			☐	☐
2.11			☐	☐
2.12			☐	☐
2.13			☐	☐
2.14			☐	☐
2.15			☐	☐
2.16			☐	☐
2.17			☐	☐
2.18			☐	☐
2.19			☐	☐
2.20			☐	☐
2.30			☐	☐
2.22			☐	☐
2.23			☐	☐
2.24			☐	☐
2.25			☐	☐

Please report how much you agree or disagree with each of the statements below:

	Strongly Disagree	**Disagree**	**Neutral**	**Agree**	**Strongly Agree**
3. When I need clinical support or assistance, I have timely access to an HIV expert in my region	☐	☐	☐	☐	☐

4. I have opportunities to share clinical experience with my colleagues on a regular basis	☐	☐	☐	☐	☐
5. Project ECHO has reduced my professional isolation	☐	☐	☐	☐	☐
6. My participation in the TeleECHO sessions has enhanced my professional satisfaction	☐	☐	☐	☐	☐
7. Access to the TeleECHO sessions has improved the quality of care I provide to the patients at my clinic	☐	☐	☐	☐	☐
8. Access to HIV specialist expertise and consultation is a major area of need for me and my clinic	☐	☐	☐	☐	☐
9. The presentations during the TeleECHO sessions provide me with useful up-to-date knowledge	☐	☐	☐	☐	☐
10. The case-based discussions during the Project ECHO sessions were not always relevant to my clinical practice and how I care for patients in my clinic	☐	☐	☐	☐	☐
11. ECHO is a useful tool for improving the sharing of information about HIV providers	☐	☐	☐	☐	☐
12. ECHO is a useful tool for national experts to use to provide technical assistance in HIV care and treatment	☐	☐	☐	☐	☐
13. I would like to join Project ECHO programs for other diseases, if the program existed	☐	☐	☐	☐	☐
14. After the pilot project is completed, I do not want to join any more TeleECHO sessions	☐	☐	☐	☐	☐
15. TeleECHO sessions were not always easy to access from my clinic	☐	☐	☐	☐	☐

Please rate your competence in each area of HIV care and treatment according to the following scale:

1 = none or no skill at all
2 = vague knowledge, skills or competence
3 = slight knowledge, skills or competence
4 = average among my peers
5 = competent
6 = very competent
7 = expert, teach others

16. Ability to provide prophylaxis, diagnose, and manage common opportunistic infections (OIs) for adults and adolescents	1	2	3	4	5	6	7
17. Ability to provide prophylaxis, diagnose, and manage common opportunistic infections in children	1	2	3	4	5	6	7
18. Ability to determine eligibility for ART in adults, adolescents, and children	1	2	3	4	5	6	7
19. Ability to counsel pregnant women for ART (PMTCT)	1	2	3	4	5	6	7
20. Ability to provide and interpret early infant diagnosis and management of infants perinatally exposed to HIV	1	2	3	4	5	6	7
21. Ability to prescribe first-line ARV regimens for all patients	1	2	3	4	5	6	7
22. Ability to recognize and manage side effects of ARV drugs for all patients	1	2	3	4	5	6	7
23. Ability to diagnose and manage treatment failure in adults and adolescents, including prescribing second-line regimens	1	2	3	4	5	6	7
24. Ability to diagnose and manage treatment failure in children, including prescribing second-line regimens	1	2	3	4	5	6	7
25. Ability to interpret the results of viral load testing for all patients	1	2	3	4	5	6	7
26. Ability to manage tuberculosis coinfection in HIV-infected adults	1	2	3	4	5	6	7
27. Ability to manage tuberculosis coinfection in HIV-infected children	1	2	3	4	5	6	7
28. Ability to counsel discordant couples in birth control, STIs, and conception issues	1	2	3	4	5	6	7
29. Ability to guide caregivers through the HIV disclosure process leading to successful HIV status disclosure to children	1	2	3	4	5	6	7
30. Ability to counsel adolescents in their transition from pediatric to adult care	1	2	3	4	5	6	7
31. Ability to serve as the HIV expert in your district/province	1	2	3	4	5	6	7

32. Overall, are you satisfied with your job?

[ ] Not satisfied at all
[ ] Not satisfied
[ ] Somewhat satisfied
[ ] Satisfied
[ ] Very satisfied

Please answer the following questions related to quality improvement (QI) activities:

33. Is your clinic participating in any quality improvement activities?

[ ] Yes

[ ] No

Please report how much you agree or disagree with each of the statements below:

	Strongly disagree	Disagree	Neutral	Agree	Strongly Agree
34. When I need support with implementing QI projects I have timely access to a QI coach in my region	☐	☐	☐	☐	☐
35. I have an opportunity to network and share QI successes with my colleagues on a regular basis	☐	☐	☐	☐	☐

Please rate your competence in each area of quality improvement according to the following scale:

1. = none or no skill at all
2. = vague knowledge, skills or competence
3. = slight knowledge, skills or competence
4. = average among my peers
5. = competent
6. = very competent
7. = expert, teach others

36. Ability to measure quality in your clinic (performance measurement)	1	2	3	4	5	6	7
37. Ability to understand performance measurement results	1	2	3	4	5	6	7
38. Ability to determine the cause of a gap in quality (determine the root cause of a quality problem)	1	2	3	4	5	6	7
39. Ability to design a plan to improve a quality problem	1	2	3	4	5	6	7
40. Ability to implement and monitor a QI plan	1	2	3	4	5	6	7
41. Ability to make change and improve the overall quality of your clinic	1	2	3	4	5	6	7
42. Ability to coach others to improve quality	1	2	3	4	5	6	7
43. Ability to serve as a QI expert in your district/province	1	2	3	4	5	6	7

44. How confident are you that you can help to improve the quality of services in your outpatient clinic?

[ ] Very confident

[ ] Confident

[ ] Somewhat confident

[ ] Not very confident

[ ] Not confident at all

45. Did you participate in any Project ECHO QI sessions?

[ ] Yes

[ ] No ---- **SKIP TO QUESTION # 59**

46. How would you rate the quality of the QI sessions?

[ ] Very poor quality
[ ] Poor quality
[ ] Average
[ ] Good quality
[ ] Very good quality

47. Were the QI sessions useful for your clinic?

[ ] Not useful at all
[ ] Not useful
[ ] Somewhat useful
[ ] Useful
[ ] Very useful

	Strongly disagree	Disagree	Neutral	Agree	Strongly Agree
48. Project ECHO has improved my access to a QI coach	☐	☐	☐	☐	☐
49. Project ECHO has improved the quality of care in my clinic	☐	☐	☐	☐	☐
50. Project ECHO has improved my motivation to do QI activities at my clinic	☐	☐	☐	☐	☐
51. Project ECHO is a useful tool for sharing QI success stories among clinics and providers	☐	☐	☐	☐	☐

General Evaluation on Project ECHO

Please contribute your opinions to improve the program.

52. How did you find out about Project ECHO?	☐	Because my region was chosen to participate					
	☐	Introduction from training courses and conferences					
	☐	Introduction from colleague/friends					
	☐	Other (specify):					
53. How practical were the session topics to your work?	☐	Not practical at all	☐	Not practical			
	☐	Somewhat practical	☐	Practical			
	☐	Very practical					
54. Which device did you most often use to participate in Project ECHO?	☐	Personal computer or laptop					
	☐	Clinic/hospital computer					
	☐	Smartphone					
	☐	Tablet					
	☐	Other: specify_____					
55. How do you generally evaluate the technical quality (Internet access, sound, and picture) of the sessions?	☐	Very weak	☐	Weak	☐	Average	☐ Good
	☐	Very good					
56. Do you think the project should be continued?	☐	Yes	☐	No			
57. Which segment of the sessions do you like most?	☐	Case conference/case presentations					
	☐	Seminar/lecture					
	☐	Quality improvement					
	☐	All					
58. What do you think about the length of each session?	☐	Too long	☐	Just enough	☐	Too short	
59. Would you like other topics presented in additional sessions?	☐	Yes	☐	No			
60. If yes, what topics do you think are necessary for your clinical practice?	Specify:						
61. If yes, what time of day in the week is the most appropriate?	Specify: day, morning or afternoon?						
62. If yes, how much time is the most appropriate?	Specify: How many hours?						

63. Do you think other specialists from other specialties need to be invited? If yes, which specialties?	Specify:
64. Other opinions:	

APPENDIX J: EXAMPLE SURVEY QUESTIONS FOR ECHO PROVIDERS, MENTORS AND CLINICAL ADMINISTRATORS

The following demographic and background information will be collected for each participant:

1. ECHO ID number☐☐☐☐☐☐

2. Gender: 1. Male ☐ 2. Female ☐

3. Age:

[ ] 18–25
[ ] 26–35
[ ] 36–45
[ ] 46–55
[ ] >55

4. What kind of diploma do you have? (Check all that apply.)

[ ] Doctor
[ ] Pharmacist
[ ] Pharmacist's assistant
[ ] Nurse
[ ] Midwife
[ ] Bachelor in public health
[ ] Other:

5. How many years of experience do you have taking care of HIV patients? (Round to nearest whole number.) _____

6. Where is your HIV clinic situated?

[ ] Intermediate hospital
[ ] District hospital
[ ] Health center
[ ] Other: _____

7. Region:___ District: _____

8. On average, how many HIV patients do you provide care for per week? _____

Survey Questions

1. Clinic staff have blocked out time during clinic hours to participate in TeleECHO sessions. Please describe how the staff of the clinic and their patients have accommodated to this situation.

_____

_____
_____
_____

a. What could the Côte d'Ivoire Project ECHO team have done to better prepare your site for participation in Project ECHO?

_____
_____
_____
_____

b. Which times of the day would work better for a Project ECHO session in this facility?

_____

2. The regular use of teleconferencing and video technology is a requirement of Project ECHO. Please describe any challenges with the use and maintenance of the technology or Internet connectivity.
3. What impact have you seen Project ECHO have on the providers who participate?
    c. Please describe any change in quality of clinical services provided
    d. Please describe any change in the clinical outcomes of patients receiving services at your site
    e. Please describe any change in sense of job satisfaction among providers at your site
    f. Should all providers in your clinic be a part of Project ECHO? Why or why not?

4. How can the Project ECHO team make this training and mentoring model as useful as possible to clinical staff in this facility?

_____
_____
_____
_____

APPENDIX K: CONFIDENTIALITY AGREEMENT

I undersigned, ..., working as an audio recorder in the context of the study on evaluation of the pilot ECHO project in Côte d'Ivoire, understand that I will have access to information on selected participants for this study.

I also will be in contact with information provided by the staff on their knowledge regarding HIV health care workers.

I understand that this information is strictly confidential and agree to protect the confidentiality of all participants.

I also am committed to protecting the privacy of the participants and to not discussing, disclosing, or sharing this information with any person, institution, or organization not directly involved in the study and not authorized to receive this information.

I will record and translate participant statements only on the study forms. I will not record or copy any names, addresses or personal phone numbers. I will not keep or show the registers or other sources of data to people not involved in the study. I will not make personal use of data recorded as part of this study.

I am aware of the potential harm to the study participants in case the collected information or their identity is disclosed.

I understand that any voluntary disclosure of information relating to this study could result in administrative and legal proceedings against me.

I agree that any document to be destroyed because it contains identifiers will be treated in accordance with the study data management procedures.

I undertake to comply with the study standards and procedures stipulated above. Any infringement of these rules will be immediately documented and reported to the investigators.

Signature of the data collector _____

Date of signature: _____

APPENDIX L: TELEECHO SESSION EVALUATION FORM

Clinic title: _____ Date: _ _/_ _/_ _ _ _
Facilitator:

_____

Objectives:

_____

Your credentials:

Physician	PA	NP	CNM	Other: _____
☐	☐	☐	☐	☐

Please rate this TeleECHO clinic on the statements listed below:

	Poor	Fair	Good	Very Good	Excellent
1. How well were the stated objectives met?	☐	☐	☐	☐	☐
2. How well did the clinic deliver balanced and objective, evidence-based content?	☐	☐	☐	☐	☐
3. Opportunities to ask questions were:	☐	☐	☐	☐	☐
4. The pace of the clinic was:	☐	☐	☐	☐	☐
5. The organization of the presenter's presentation was:	☐	☐	☐	☐	☐
6. The presenter's ability to clearly communicate was:	☐	☐	☐	☐	☐
7. The relevance of the presentation to this clinic's objective was:	☐	☐	☐	☐	☐

	Yes	No
8. Did you feel that this clinic conveyed any commercial bias?	☐	☐

9. Changes that I am going to make in my practice:

10. If no changes, what are the barriers?

11. Did you present a patient case today? Y/N

12. If yes, how would you rate the value of the discussion/input that occurred?
    (1-5, not valuable to very valuable)

13. Did the case discussion change your care plan for this patient? Y/N

14. If yes, how?

15. If no, why not?

16. Did you learn something new from the discussions of cases presented by others today? Y/N (Please circle.)

17. If yes, did you learn something that will be useful in caring for your patients? Y/N (Please circle.)

18. If yes, in what way?

19. What feedback or suggestions do you have about how to make the case discussions more useful?

20. What did you like best about this TeleECHO session?

21. What did you like least about this TeleECHO session?

22. Please list topics of future interest and additional comments regarding this session:

APPENDIX M: BUDGET OF THE EVALUATION OF THE ECHO MODEL

Pre-test

Activities	Size	Days/pages	Unit cost	Total cost (F CFA)	Total (US $)
Administration : Supply and communication					
Printing of data collection tools	3358	1	25	83950	$ 152,64
Communication fees	6	1	10000	60000	$ 109,09
Transport fees for data collectors	0	0	0	0	$ -
Total administrative costs				**143950**	**$ 261,73**
Data collectors training					
Training room rental	0	0	0	0	$ -
Tea break	10	6	2500	150000	$ 272,73
Breakfast	10	3	8000	240000	$ 436,36
Training kit	10	1	2000	20000	$ 36,36
Transport fees for participants	4	3	5000	60000	$ 109,09
Total training cost				**470000**	**$ 854,54**
Data collection					
Car rentals	2	6	80000	960000	$ 1 745,50
Per diem for data collectors	6	6	30000	1080000	$ 1 963,60
Accommodation for data collectors	6	6	25000	900000	$ 1 636,40
Fuel fees for study team A	1	1	150000	150000	$ 272,73
Fuel fees for study team B	1	1	150000	150000	$ 272,73
Total costs for pilot phase				**3240000**	**$ 5 890,96**
Data management					
Consultancy's fees for two data clerks	2	5	25000	250000	$ 454,55
Data analysis	1	10	0	0	$ -
Total cost for data management				**250000**	**$ 454,55**
Pre-test dissemination workshop					
Meeting room rental	0	0	0	0	$ -
Tea break	20	1	4000	80000	$ 145,45
Kit for participants	0	0	0	0	$ -
Transport for participants	10	1	5000	50000	$ 90,91

Total pre-test dissemination				**130000**	**$ 236,36**
Total cost of activities				**4233950**	**$ 7 698,14**

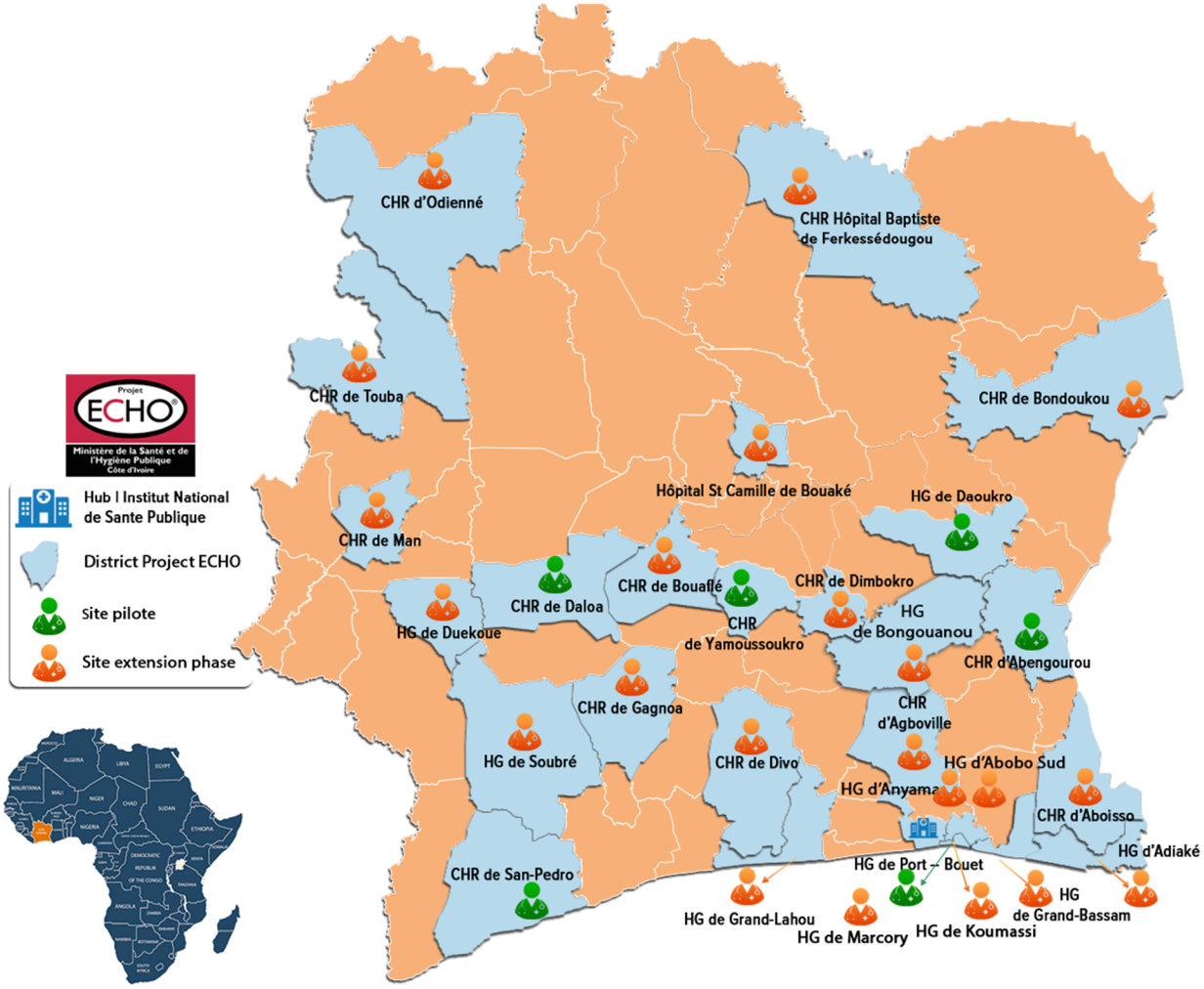
Post-test

Activities	Size	Days /pages	Unit cost	Total (F CFA)	Total (US $)
Administration: Supply and communication					
Printing of data collection tools	600	1	25	15000	$ 27,00
Communication fees	8	1	10000	80000	$ 145,00
Transport fees for data collectors	0	0	0	0	$ -
Total administrative costs				**95000**	**$ 172,00**
Data collectors training					
Training room rental	0	0	0	0	$ -
Tea break	10	4	2500	100000	$ 181,82
Breakfast	10	2	8000	160000	$ 290,91
Training kit	10	1	2000	20000	$ 36,36
Transport fees for participants (FGDs and IDIs) and data collectors from PNLS and INSP	6	2	5000	60000	$ 109,09
Total training costs				**340000**	**$ 618,18**
Data collection					
Car rentals	2	6	80000	960000	$ 1 745,45
Per diem for data collectors	6	6	30000	1080000	$ 1 963,64
Accommodation for data collectors	6	6	25000	900000	$ 1 636,36
Fuel fees for study team A	1	1	150000	150000	$ 272,73
Fuel fees for study team B	1	1	150000	150000	$ 272,73
Total pilot phase				**3240000**	**$ 5 890,91**
Data management					
Consultancy's fees for two data clerks	2	5	25000	250000	$ 454,55
Transcription fees of qualitative interview	1	10	80000	800000	$ 1 454,55
Qualitative data collection fees	2	6	80000	960000	$ 1 745,45
Translation fees for the qualitative reports	1	1	200000	200000	$ 363,64
Total cost of data management				**2210000**	**$ 4 018,19**
Total cost of activities				**5885000**	**$ 10 699,28**

APPENDIX N: EVALUATION METHODS PARTICIPANTS' SCREENING FORMS

I. Focus group discussion	**II. In-depth interview**
- Physicians, nurses, midwives, and pharmacists	- Physicians, nurses, midwives, and pharmacists
- Have participated in at least two sessions of the total sessions	- Have participated in at least two sessions of the total sessions
- Informed consent	- Unable to schedule time to participate in an FGD
	- Informed consent
NB : Participants must fully fill out all these criteria to participate in IDIs	*NB : Participants must fully fill out all these criteria to participate in FGDs*
III. Pre-test (survey of knowledge, perceived behavioral capability, and professional satisfaction)	**IV. Pre-test (survey of knowledge, perceived behavioral capability, and professional satisfaction)**
- Physicians, nurses, midwives, and pharmacists at each pilot site	- Physicians, nurses, midwives, and pharmacists
	- Have completed the pre-assessment
NB : Participants must fully fill out all these criteria to participate in the pre-test	- Have participated in at least two sessions of the total sessions
	NB : Participants must fully fill out all these criteria to participate in a post-test

ANNEX O: PROJECT DJASSO ECHO EXPANSION



APPENDIX P. LIST OF CASE PRESENTATIONS

Brief Summaries of Case Presentations
Under the test and treat all strategy we delayed some ARV treatment because of the presence of a comorbidity factor. This strategy cannot be applied to all people who tested positive for HIV systematically.
Adult patient with significant weight loss (with current weight almost similar to the weight of child), significant Somnolence since onset of ARV), significant Somnolence since onset of ARV.
43 year old patient, who came to the clinic for recurring fever, with clinical anemia for whom HIV testing was proposed and accepted, and also at the suggestion of her sister who was responsible for the management of the prescriptions.
This is a patient who is illiterate and in a state of deafness living in concubinage with a history of non-numerical slimming in which the HDM and the somatic examination have led to the conclusion of a non febrile diarrhea evolving in a context of pulsatile headaches
HIV patient with VRA with a comorbidity factor (HTA) not stabilized for 8 years who experienced a transient ischemic stroke
HIV 1-positive patient, CDC stage C on second-line treatment who had neuromeningal tuberculosis associated with brain toxoplasmosis diagnosed in November 2015, which occurred in a context of significant CD4 decline despite adherence to ARV treatment whose effectiveness on the protocol taken was proven by genotyping. The rise in CD4 counts occurred at the end of TB treatment. It now poses the problem of a gradual decrease in the CD4 level since February 2018 despite the good adherence to ARVs and two viral loads undetectable
44-year-old patient, HIV 1 positive, tested in 2016 (with CD4 35/mm3), on ARV since June 2016 (TDF+3TC+EFV); observing ARV treatment. Last CD4 at 407 / mm3, with first undetectable viral load and second viral load at 60 copy / ml (1.78 log/ml). The patient has been classified stable since March 2018, the ARV for refill in 3 months, the clinical follow-up in 6 months, and the follow-up bioassay in 12 months.
36-year-old HIV 1 positive patient with no particular history followed since 2014 whose various viral loads are increasing despite good adherence. Hospitalized for febrile diarrhea with altered general condition. Patient is receiving a second line treatment using TDF + 3TC + LPV/r
55 year old patient who tested positive for HIV 1 in 2011, observing with undetectable VL and two recent viral load test results not yet available, a CD4 at 475/mm3 since 2015 who today was retested for HIV and had a negative test. Both Starpak and Elisa (DIAPRO HIV) tests were negative.
67-year-old patient receiving ARVs (AZT + 3TC + NVP) since February 2005, observing, but who was put on TARV of 2nd line (TDF + 3TC + LPV/r) in September 2012 for treatment failure. He experienced adverse reactions to LPV/r with persistent diarrhea, which led to the substitution of LPV/r by ATZ/r in September 2014. In May 2016, he presented persistent myalgia associated with fatigability whose investigation revealed a hyperlactatemia that motivated the temporary suspension of ARVs. The ARVs were reintroduced two months later, with the LPV/r + ATZr protocol that helped stabilize our patient.

13-year-old adolescent girl who has been attending the pediatric department of (*facility name*) since the age of 7, who was diagnosed with HIV 1 and who was classified as a WHO Stage 2 who, from the age of 7, was readily available for treatment, with consent from the mother. The mother died 04 years later without disclosing the child's state of health. Early in the child's adolescence, she becomes unobservant with a viral load of 8,540 copies. Following the advice of the social worker to the father, she was informed of her status, which she accepted with difficulty but became adherent to the treatment.
14-year-old patient tested positive for HIV 1 in 2010 (6 years). Buco esophageal candidiasis ATCD. CD4 initial 1 cell/ml (0.08%) CV to 262,694 copies/ml (March 2016). After second treatment initiation with ABC+3TC+LPV, good evolution with a CD4 at 60.3 cells/mL and an undetectable VL
38-year-old patient, who has been screened for coinfection HIV1/ HBV, with CD4 at 258 / mm3 and extensive hepatic cytolysis at 3N, for whom ARV therapy should be prescribed.
14-year-old male who was hospitalized on 02/02/2015 for gastroenteritis plus severe malnutrition and who tested positive for HIV1. The investigation showed that he had been followed at the (*name of community-based care and treatment organization*) since 02/05/2007. At the time of transfer, he had a very bad general condition, oral candidiasis, oily cough and wart-shaped dermatosis. His CD4 count was 06 /mm3. He weighed 21 kg and received bi-antibiotic therapy, nutritional rehabilitation, antifungal therapy and wart treatment. We moved to a second line with AZT, 3TC, LPV/r. At the check after one month he weighed 27 kg and after 6 months he weighed 31 kg and his CD4 was at 412 / mm3. Afterwards, we lost sight of him. A VAD in March 2017 brought it back to us with general condition alteration and a CD4 at 22 / mm3. Despite increased adherence, his overall condition did not improve and his viral load on 05/29/2018 decreased to 328,000 copies. We've concluded a treatment failure. We put him on TDF, 3TC and EFV. The viral load control of 24/09/2018 returned to 217 copies or 2.34 log / ml. On this day, he weighs 36 kg and is in good general condition.
HIV positive patient receiving ARVs who developed primary failure of ARV due to severe oozing dermatosis whose ARV regime change resulted in a marked improvement in health status
17-year-old teenager in third grade, HIV-1 positive detected since 2011 with fever, cough and general condition impairment (with initial CD4 at 154 / mm3), taking ARV since November 2011 (first D4T+3TC+EFV, then AZT+3TC+EFV, and currently TDF+3TC+EFV); not following ARV treatment. Last CD4 at 60 / mm3, current viral load is 389,000 copies/ml or 5.59 log. The disclosure of his HIV status was made in 2016 by the father. The latter being absent in 2017, we found after questioning of the adolescent; non-adherent to treatment ARV since June 2017.
Unobservant patient who had severalopportunistic infections, finally died on 04/04/217
10-year-old patient tested HIV positive in 2011 with a history of anemia at initiation of ARV treatment, with good adherence for several years, with current ARV regimen ABC+3TC+EFV and who has a VL detectable at last check on 29/10/2018 after 3 VL marked by viral suppression. It should be noted that the patient spent more than two months in Abidjan during the school holidays.
18-year-old HIV 1 positive without any particular history followed since 2012 whose various viral loads are growing with poor adherence. Patient presented with a series of events including a persistent cough resistant to antibiotics and antitussives, a diffuse abdominal pain from oral and esophageal candidiasis in which we suspected intestinal tuberculosis. Currently on trial treatment

16-year-old patient tested positive for HIV 1 in December 2013, not observed (until 2017) with a CD4 count of 25 cell/ml in June 2018 and a VL of 4.93 log/ml in Nov 2018. A patient who, after several hospital stays, ended up with depression with moral repercussions for his family and health care staff.
HIV 1 positive patient was receiving TDF+ 3TC + EFV who was eligible for TB prophylaxis with isoniazid in November 2018; was later diagnosed with pulmonary TB in December 2018 after active TB screening at his next appointment Information gathered after investigation showed tha thte patient prioritized the TB over the ART because ART required too many tablets As HCW, we are the ones to blame because we emphasized the use of isoniazids in the prevention of TB for the success of the pilot project, which led the patient to neglect the ARVs that are also very important for the care of an HIV-infected patient.
53-year-old HIV 1- positive patient with no specific history who experienced significant weight loss and asthenia with TARV and who was diagnosed with pulmonary tuberculosis in November 2018 after three (3) CT BAAR test requests over an eight (8) month period. It should be noted that the patient had an initial CD4 cell count of 34 cells /ml and an undetectable VL six months after TARV onset.
HIV positive patient receiving TDF+3TC+EFV with pulmonary tuberculosis in July 2018 who died later of renal failure. Investigation in December 2018: Urea 56 mg/L; serum creatinine 445 mg/L and no other urea creatinine Transat CBC done before December exam in the clinic, just before the patient died. The reasons for death are that the patient follow-up was not correct because the procedure disrupted the patient who was still taking ARVs at the facility despite the CAT referral
Presentation of the NGO ELAN d'AMOUR Strengthening the post-test Psychological support Compliance counselling and advice for new patients Systematic support Management of patient appointments (by telephone calls ,reminder of appointments 48 hours before the date) Home visits Organization of support groups Working with community counsellors at other sites Involvement of CSOs in finding patients who missed their appointments
HIV/HBV coinfected pregnant woman, who was screened for CPN and died of HBV complications in late pregnancy after delivery of live birth. The infant did not benefit from any Hepatitis B prevention activities.

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