REPUBLIC OF KENYA

MINISTRY OF HEALTH

Impact of the Different Models of HTS and Linkage to ART on Treatment Outcomes in CHAK - CHAP Uzima Supported Facilities, Kenya

FINAL REPORT

Supporting the Implementation and Expansion of High Quality, Sustainable and Comprehensive HIV Prevention, Care and Treatment Programs in Faith-Based Organization Facilities in the Republic of Kenya under the President's Emergency Plan for AIDS Relief (PEPFAR)

1ST APRIL ,2017 – 29TH SEPTEMBER,2022

Abbreviations/Acronyms

AIDS	Acquired Immune Deficiency Syndrome
APNS	Assisted Partner Notification Service
ART	Anti- Retroviral Therapy
CCC	Comprehensive Care Center
CDC	Centre for Disease Control
CHAK	Christian Health Association of Kenya
CHAP Uzima	CHAK HIV/AIDS Project Uzima
COP	Country Operational Plan
CQI	Continuous Quality Improvement
GBV	Gender – Based Violence
HCW	Health Care Worker
HIV	Human Immunodeficiency virus
HIVST	HIV Self-Test
HTS	HIV Testing Services
IQR	Inter Quartile Range
IRIS	Immune Reconstitution Inflammatory Syndrome
LIP	Local Implementing Partner
MCH	Maternal and Child Health
MOH	Ministry of Health
NASCOP	National AIDS and STI control program
OVC	Orphans and Vulnerable Children
PEPFAR	United States President Emergency Plan for AIDS Relief
PITC	Provider Initiated Testing and Counselling
PLHIV	People Living with HIV
PMTCT	Prevention of Mother to Child Transmission
PrEP	Pre- exposure Prophylaxis
SD	Standard Deviation

SNS	Social Network Strategy
TB	Tuberculosis
UTT	Universal Test and Treat
VCT	Voluntary Counselling and Testing
VLS	Viral Load Suppression
WHO	World Health Organization

Definition of Terms

HTS Models:	HIV Testing Models are either defined as facility – based testing (HIV Testing that takes place within the facility in the various service delivery points) or community – based testing (HIV Testing that takes place outside the facility setting, and within the community settings, especially in partner notification and social networking strategies.
HTS Approaches:	HIV Testing Approaches include Provider – initiated Testing and Counselling (PITC), Voluntary Counselling and Testing (VCT), Self – testing (HIVST) and Index Testing.
HTS Strategies:	HIV Testing Strategies include Hospital Patient (HP) that is testing for a regular client/patient visiting the facility to receive a service, Non- Hospital Patients (NP) that is testing for a client not visiting the hospital for a health service, including individuals visiting admitted patients, individuals escorting ill clients to the facility amongst others. HTS Strategies also include Home- based testing targeting index contacts, targeted outreach for key and priority populations.

Executive Summary

The World Health Organization (WHO) in 2016 revised the HIV testing recommendations to include targeted testing approaches such as index testing and assisted partner notification services (aPNS) to routine health facility and community-based testing models. This was with the aim of breaking the chain of HIV transmission by offering HIV testing services (HTS) to persons who have been exposed to HIV and linking them to ART if positive, or prevention services if negative. In line with scale-up of targeting testing approaches in addition to routine health facility and community-based testing models by the Ministry of Health (MoH) Kenya, the Christian Health Association of Kenya (CHAK) through funding from the Centers for Disease Control and Prevention (CDC) in its five and a half years HIV program (CHAP *Uzima)* has implemented the nationally recommended testing models and approaches within all its supported health facilities. CHAK - CHAP *Uzima* sought to evaluate how the different models of HTS and linkage to ART service interventions have impacted time-to-ART start and treatment outcomes at CHAP-*Uzima* supported health facilities for the period between 2017 and 2022.

The evaluation employed a retrospective cohort design to analyze routinely collected program data stored in electronic medical records (KenyaEMR). All new HIV positive clients identified and started on ART between October 2017 and March 2022 in 78 project supported health facilities were included in the evaluation. The evaluation data was extracted from existing client-level data from KenyaEMR and National AIDS and STI Control Programme (NASCOP) HTS data collection and reporting tools. Quantitative data was abstracted and analyzed for trends in performance over the project period while logistic regression was used to assess the impact of the different models of HTS and linkage on viral suppression and retention using yearly cohorts. Survival analysis was done to establish the impact of the different models of HTS and linkage on time to ART start.

A total of 15,555 records were included in the analysis of whom 65% (10,090) were female while the median age in years (interquartile range) was 37 (30- 46). 11,174 records had client type indicated, the majority 10,798 (97%) were general population while key and priority populations constituted 11(0.1%) and 78 (0.7%) respectively.

In terms of testing model, 11,169 had complete data of which 9,486 (84.9%) of the clients were tested in a health facility. Hospital patients were the highest contributor to testing strategy (59%), while Provider Initiated Testing and Counseling (PITC) was the highest contributor to testing approach (47%). Among newly identified HIV positive clients, there was no significant difference in time-to-ART start between community and health facility models (p=0.215), however the median time to ART start varied significantly by testing approach and those tested through Voluntary Counseling and Testing (VCT) approach had the shortest time-to-ART start compared to index testing and PITC (p<0.001). Viral suppression varied significantly by testing model and those tested through a health facility were more likely to be suppressed compared to those tested at community level (p=0.009). In regard to the testing approach, those tested through PITC were more likely to be virally suppressed compared to those tested through index testing (p=0.05). Retention varied significantly by testing strategy and those tested as hospital patients and through mobile testing were less likely to be retained compared to those tested through home-based strategy (p<0.001 and p=0.001) respectively. Higher proportion of those tested through the index testing approach were retained (84%) compared to those tested through PITC and VCT (73% and 76%) respectively.

From the evaluation, the type of testing model does not affect the number of days to start ART; however, the testing approach has a significant effect on the time of ART start. Despite index testing being a cost-effective approach towards identification of new positives, PITC remains a significant testing approach in identification of persons living with HIV (PLHIV) and effective linkage to the treatment cascade towards viral suppression. For PLHIV identified through index testing, individualized client centered approaches are necessary to ensure timely ART initiation and sustained Viral Load Suppression.

This evaluation project has been supported by the President's Emergency Plan for AIDS Relief (PEPFAR) through the US CDC Kenya under the CHAK CHAP *Uzima* program of Cooperative Agreement #: GH002034. The findings and conclusions in this report are those of the author(s) and do not necessarily represent the official position of the funding agencies.

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Background

In 2021, 40 years after the emergence of the global HIV pandemic and despite the impressive scale-up of ART worldwide, there were still an estimated 690 000 AIDS-related deaths and 1.7 million new HIV infections, far above the 2020 global goals of less than 500 000 deaths and 500 000 new infections[1]. The universal test and treat (UTT) strategy is the cornerstone of the global AIDS control effort to identify all persons living with HIV (PLHIV), promptly initiate ART and achieve sustained viral load suppression to improve health outcomes and prevent onward HIV transmission[2], yet an estimated one in five PLHIV globally are unaware of their HIV status[1]. Closing the HIV testing gap and diagnosing 95% of all people with HIV by 2030 is critical to the success of the global HIV response. The global UNAIDS target stipulates that 95% of adults will know their HIV status, 95% of HIV positive will receive sustained ART, and 95% of those who are on ART will achieve viral load suppression by 2030. Knowledge of a positive status is therefore a critical first step in linking to life-saving treatment and achieving viral suppression, to improve the health of PLHIV and to reduce onward transmission. Similarly, confirmation of a negative HIV status can link individuals to information and prevention services, including highly efficacious pre-exposure prophylaxis (PrEP), to remain uninfected[3].

In 2005 it was estimated that only 10% of PLHIV in Africa were aware of their HIV status and that, globally, only 12% of people who wanted to test for HIV were able to[4]. By 2015, it was estimated that 55% of all PLHIV in Africa and 60% of PLHIV globally knew their status[5] and that more than 600 million people received HIV Testing Services (HTS) in 122 low- and middle-income countries in the years 2010–2014[6]. The increase in HIV testing uptake was largely attributed to the scale-up and use of effective HIV treatment and the wide availability of low-cost rapid diagnostic tests. In spite of these achievements, a substantial testing gap remains. According to recent estimates, 77% of all people diagnosed with HIV are on ART; however, 40% of PLHIV remain undiagnosed[5]. Furthermore, despite the annual increases in HIV tests and HIV testing coverage, in many settings HTS is not sufficiently focused[6]. Many of those at highest risk, such as men, partners of people with HIV, adolescents and young people in high HIV prevalence settings and key populations worldwide, remain unreached[4].

With more than 40% of PLHIV being unaware of their HIV status in Africa, the sub-optimal testing uptake remains a critical barrier to scaling-up HIV prevention, care and treatment programmes[7]. In addition, late presentation for ART negatively impacts treatment outcomes among PLHIV in Africa, leading to high mortality, and high transmission of the virus[8,9]. The focus on HIV programming to the "right places" and reprogramming of HIV diagnoses, care, and treatment activities to the highest-burden areas has been the cornerstone of targeted testing and resource allocation towards HIV epidemic control in recent years[10]. It is expected that with epidemic control, it will be increasingly hard to find new HIV diagnoses without properly planned location-based HTS strategies[11].

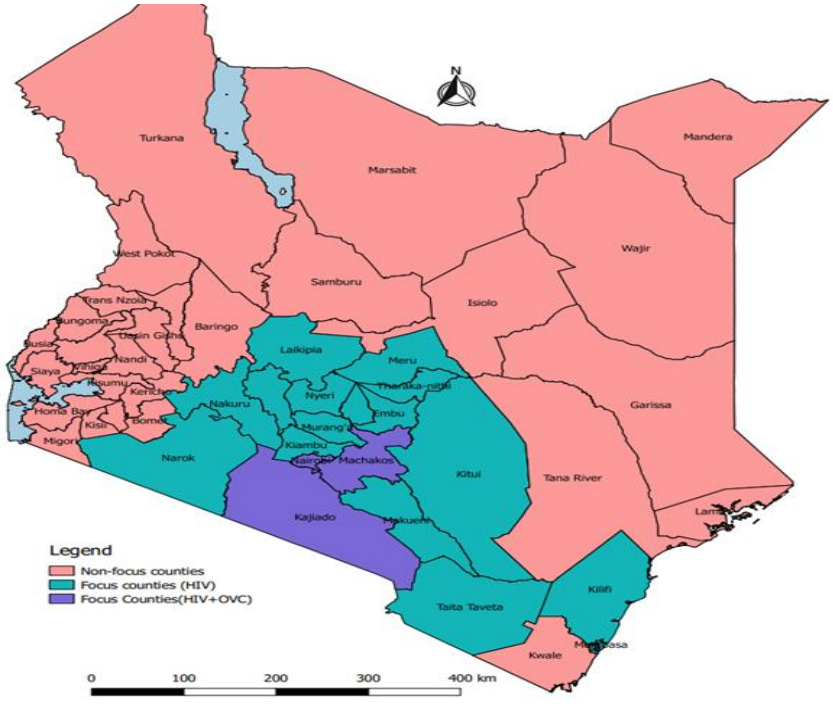
Towards targeted testing, the World Health Organization (WHO) in 2012 recommended partner testing in addition to routine health facility based and community-based testing. In 2016, WHO provided additional guidance on assisted partner notification services (aPNS) and HIV self-testing (HIVST). The guidance described how HIVST and aPNS services could be integrated into both community and facility-based HTS approaches and be tailored to specific population groups including: general populations, pregnant and postpartum women, couples and their partners, adolescents (10–19 years old) and young people (15–24 years old), key populations, people in sero-discordant sexual partnerships and other priority and vulnerable populations[4].

In 2018, Kenya was estimated to have 36,000 annual new HIV infections among adults, with a prevalence rate of 4.9% among adults (1.3 million) and 0.7% among children (139,000). With the 5th largest number of PLHIV in the world, HIV continues to be a leading cause of morbidity and mortality in Kenya. Despite the substantial effort by the Ministry of Health (MoH) in trying to expand HIV testing services in Kenya, overall HIV testing coverage still remains far below Kenya's national goal of testing 80% of all adolescents and adults[12]. The success of ART treatment programs among children (0-14yrs) and adults is largely dependent on early diagnosis and prompt ART initiation. A total of 34,337 (32%) children living with HIV (CLHIV) were not on ART treatment by the end of 2019, and in 2020, Kenya reported 4,333 and 6,572 AIDS-related deaths among children and adults respectively[13]. Since WHO recommended adopting HIVST and aPNS in 2016, MoH, Kenya has progressively scaled-up the uptake of these testing modalities at health facility and community level in addition to the routine provider and client-initiated testing and counseling [13,14]. Furthermore, MoH, Kenya in collaboration with the President's Emergency

Plan for AIDS Relief (PEPFAR) - Kenya and other stakeholders developed minimum standards to safe and ethical index testing in 2020 for countrywide scale-up, and included HIVST as a screening test in HIV case identification into the national HIV testing guidelines and differentiated service delivery strategies.

Towards HIV epidemic control in Kenya, the Christian Health Association of Kenya (CHAK) through the Centers for Disease Control and Prevention (CDC) has been funded through its HIV program (CHAP *Uzima*), to oversee the expansion and provision of sustainable high-quality HIV care and treatment services at 79 faith-based and affiliated health facilities and four Orphans and vulnerable Children (OVC) Local Implementing Partners (LIPs) distributed across 19 counties in Kenya for the period between 1st April 2017 to 29th September 2022. In September 2020, project support was withdrawn from one health facility and one OVC LIP in Narok county due to low HIV burden in the county in line with PEPFAR Kenya Country Operational Plan (COP) guidance. The projects' focus counties for implementation of HIV prevention and treatment services and OVC support are as demonstrated below:

Figure 1:CHAP Uzima Focus Counties



In line with universal test and treat (UTT), CHAK - CHAP *Uzima* has deployed the nationally recommended HIV testing approaches at health facility and community level within its scope of

geographical coverage with appropriate linkage to treatment throughout the project period. Index testing, HIVST and Social Network Strategy (SNS) were rolled-out across project supported health facilities in January 2019, September 2019, and March 2022 respectively. Through funding for the Faith and Community Initiative (FCI), the project also rolled-out HIVST within places of worship towards male identification in July 2020 in five of the 19 project supported counties (Kiambu, Kajiado, Nairobi, Nakuru and Kilifi). In line with the objectives, CHAK - CHAP *Uzima* sought to evaluate the impact of the different models of HTS and linkage to ART on treatment outcomes within the project supported health facilities for the period between October 2017 and March 2022 towards identification of key program successes in HTS approaches and lessons learnt.

The evaluation goal and primary evaluation question are outlined below:

Evaluation Goal

- To assess how the different models of HTS and linkage to care/ART service interventions have impacted time-to-ART start and treatment outcomes at CHAP-*Uzima* supported health facilities during the period 2017 to 2022.

Evaluation Question

- How have the different models of HTS and linkage to care/ART at CHAP-*Uzima* supported facilities impacted treatment outcomes including time-to-ART start?

Evaluation Methodology and Approach

Evaluation Design:

The evaluation employed an analysis of retrospective client chart reviews of routinely collected program data stored in the electronic medical records (KenyaEMR) and HTS registers of all tested and enrolled clients in 78 CHAP *Uzima* supported health facilities located in 19 counties between October 2017 and March 2022.

Sampling Strategy:

All newly HIV positive clients identified and started on ART between October 2017 and March 2022 in CHAP *Uzima* supported facilities.

Exclusion criteria:

- All clients who were newly initiated on ART but were tested before/prior to the study period.
- All clients tested positive in the evaluation period but were not linked to care and treatment
- Data from HTS registers with CCC numbers that could not match those from KenyaEMR.
- Data from one health facility not actively supported by the project for the entire period between October 2017 and March 2022

Data collection Strategy:

Evaluation data was extracted from existing client level data from KenyaEMR and NASCOP HTS registers. A data collection tool was developed to extract the quantitative data to assess how the different HTS models and linkage to care/ART at CHAP *Uzima* supported facilities have impacted on treatment outcomes including time - to - ART start, retention and viral suppression.

The evaluation adopted triangulation methods that include data abstraction from the KenyaEMR, Enrollment tracker and HTS registers. Data triangulation was done at analysis stage when the evaluation database was being developed. Data extracted from the KenyaEMR and the HTS registers was merged using client Comprehensive Care Centre (CCC) number as a common unique client identifier.

Quantitative data across the project years on HTS strategy, HTS approach, HIV positive client's linkage to ART, as well as the treatment outcomes was abstracted.

Data analysis

Quantitative data abstracted was analyzed for trends in performance over the project period. Summaries were generated using frequencies, proportions, mean, standard deviation (SD) and median, interquartile range (IQR).

Logistic regression was used to assess the impact of the different models of HTS and linkage on viral suppression and retention at 12, 24, 36, and 48 months using yearly cohorts. Survival analysis was done to establish the impact of the different models of HTS and linkage on time to ART start.

All the analysis was considered significant at 95% confidence interval. The triangulation of the results using separate techniques was used to ensure the rigor of the analytical process. Findings are presented in the form of tables and charts.

Data analysis plan

To maintain integrity and quality in the evaluation, a data evaluation plan was developed. The data analysis plan ensured that data on different HTS models, linkage and ART initiation was collected and analysis done.

Table 1:Data Evaluation Plan for the Impact of Different Models of HTS And Linkage to ART on Treatment Outcomes in CHAP Uzima Supported Facilities (October 2017 to March 2022).

Outcome	Indicators	Disaggregation	Data source	Analysis method
Time to ART start	Percentage of clients initiated on ART; immediately (test and treat), within two weeks and within one month.	Age, gender	KenyaEMR and HTS registers	Mean (SD), Median (IQR). Survival analysis (cox regression)
Viral suppression	Percentage of clients virally suppressed, unsuppressed in yearly cohorts.	Age, gender, population type (General population Key population Pregnant and Breastfeeding (PMTCT) Priority population)	KenyaEMR, monthly reports (MOH 731 and Program Children and Adult Care and Treament report)	proportions, trends, logistic regression
Retention	Percentage of clients retained in 12,24,36, 48 and 72	Age, gender, month (12, 24,	KenyaEMR, monthly reports (MOH	proportions, trends, logistic regression

	months in yearly cohorts.	36 and 48), population type	731 and Program Children and Adult Care and Treatment report)	

Limitations

Findings in this report are subject to a number of limitations. Index testing outcomes are restricted to those contacts who were successfully reached and consented to test through index testing approach. This excludes the number of contacts to index clients reached for HTS in healthcare facilities as either VCT or PITC.

Stakeholder Engagement

Stakeholders identification and meaningful engagement was done systematically. However, the scope of involvement in the evaluation varied by context. Decision makers included CHAK-CHAP *Uzima* project leadership, county health management teams, NASCOP, CDC and program beneficiaries including clients, facilities management, facility staff, community health workers, peer educators and PrEP champions. Other PEPFAR implementing partners and community networks within the program implementation counties acted as collaborative partners towards appropriate referral and linkages for sample networking, higher level management of comorbidities among PLHIV such as cancers, community linkages towards education programs for OVCs, and linkages towards the justice system for identified cases of sexual and gender-based violence.

Ethical Considerations

The project protocol was reviewed in accordance with CDC human research protection procedures and was determined to be research, but CDC investigators did not interact with human subjects or have access to identifiable data or specimens for research purposes (Appendix i). Local approval of the protocol was also received from the Kenyatta National Hospital-University of Nairobi (KNH-UON) Institutional Review Board (IRB) (Appendix ii). Letter of permission to access data

and confidentiality agreement forms were obtained and provided to investigators and evaluation team before importing data for analysis. The investigators and evaluation staff also undertook human subject protection training (Appendix iii). In accordance with U.S. 45CFR 46.116 (d), a waiver of informed consent for the abstraction of clinical data was approved because the evaluation was retrospective, involved no more than minimal risk, and would not adversely affect the rights and welfare of clients.

Use of evaluation findings

Evaluation findings will primarily be used for:

- Inform the program on the effectiveness of its identification and linkage strategies towards reprogramming as appropriate.
- Identification of innovative identification and linkage strategies for dissemination through best-practice sharing forums with other implementing partners and stakeholders.

Dissemination of program successes through abstracts presented in scientific conferences and publications.

Results

A total of 15,555 records were included in the analysis but the denominator in each variable will vary depending on the complete record. Of these, 10,090 (65%) were female while the median age in years (IQR) was 37 (30- 46). 11174 clients had population type and the majority of the clients 10,798 (97%) were categorized as general population and the least 11(0.1%) were key population. A total of 14,636 clients had testing point indicated and 9,501 (55%) of these clients were tested within the outpatient department (OPD). In terms of testing strategy there were 10,938 clients with testing strategy indicated, hospital patients had the highest contribution at 6,545 (59%) while PITC had the highest testing approach at 5,266 (47%) followed by index testing at 4,131 (37%). Among the clients, 10,894 (70%) were started on ART on the same day of testing. Of the 4,661 that did not start ART on the same day of testing, 3,063 (66%) started ART between Day 1 and Day 14, while 1,598 (34%) started ART after 14 days.

Table 2 :Descriptive Statistics for the study population for HTS and Linkage to ART of clients in CHAK - CHAP Uzima Supported Facilities (October 2017 to March 2022)

Characteristic	Frequency (%)
Gender N= 15555	
Male	5,465(35)
Female	10,090(65)
Population type N=11174	
General population	10, 798(96.6)
Key population	11(0.1)
Pregnant and Breastfeeding (PMTCT)	287(2.6)
Priority population	78(0.7)
Testing Point (N=14,636)	
CCC	136(0.9)
Index	1788(12.2)
In patient Department (IPD)	527(3.6)
Maternal and Child Health (MCH)	727(4.9)
Outpatient Department (OPD)	8438(57.7)
VCT	2947(20.1)
Outreach	73(0.5)
Testing strategy (N=10,938)	
Hospital patient	6543(58.6)
HTS in VCT	2244(20.1)
Non-hospital patient	1235(11.1)
Home-based	886(7.9)
Mobile testing	30(0.3)
Testing Approach (N=11,173)	
Index	4131(36.9)
PITC	5266(47.1)
VCT	1776(16.0)
Testing Model (N=11,169)	
Facility	9486(84.9)
Community	1683(15.1)
Days to ART start (N=15,555)	
Same day (0)	10894(70)
=>1 day	4661(30)
Linkage status (N=16926)	
Extra facility	1760(10)
Intra facility	15166(90)

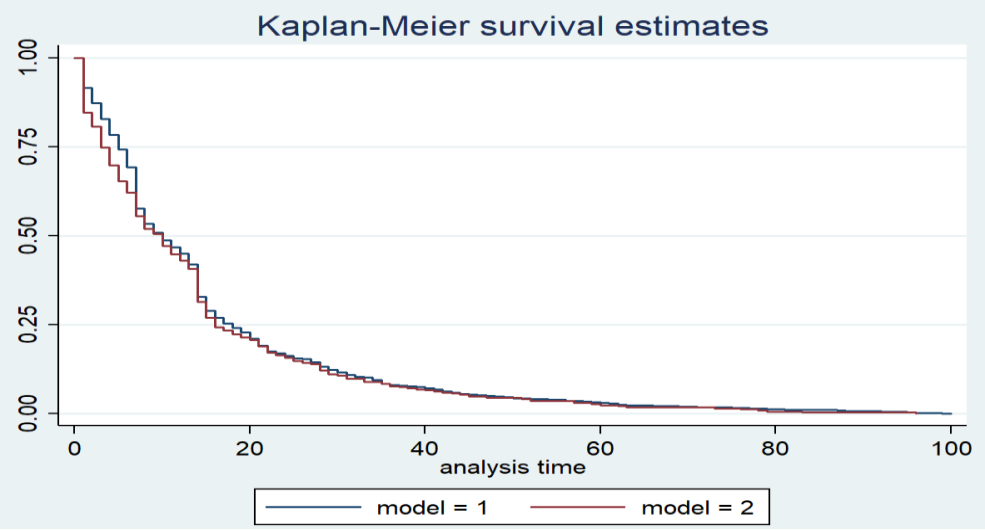
Key: Hospital patient: Sick individual presenting in hospital for treatment; has either an OPD/IPD number. Non-hospital patient: Well individual accompanying a sick client to the facility: has neither an OPD nor an IPD number.

Time to start of ART

Time to ART Start by testing model

For survival analysis on the effect of testing model to Time-to-ART, day-to-ART start was treated as the censor variable where 1 meant censored (i.e., started ART some days after enrollment). The median time (IQR) to start ART in days for both facility and community models was 10 days (5, 18). Test of equality of survival functions indicated that the number of days to ART of the clients did not vary significantly between facility and community models (chi=1.69, p=0.1932). This is confirmed by the insignificance of the Log-rank test for equality of survivor functions as well as graphically by the Kaplan Meier survival curves.

Figure 2 : Kaplan Meier Survival Curves of Time to ART Start by Testing Model of clients in ART in CHAK-CHAP Uzima supported health facilities between October 2017 to March 2022.



There was no significant difference in time to ART start between community and facility models (p=0.215).

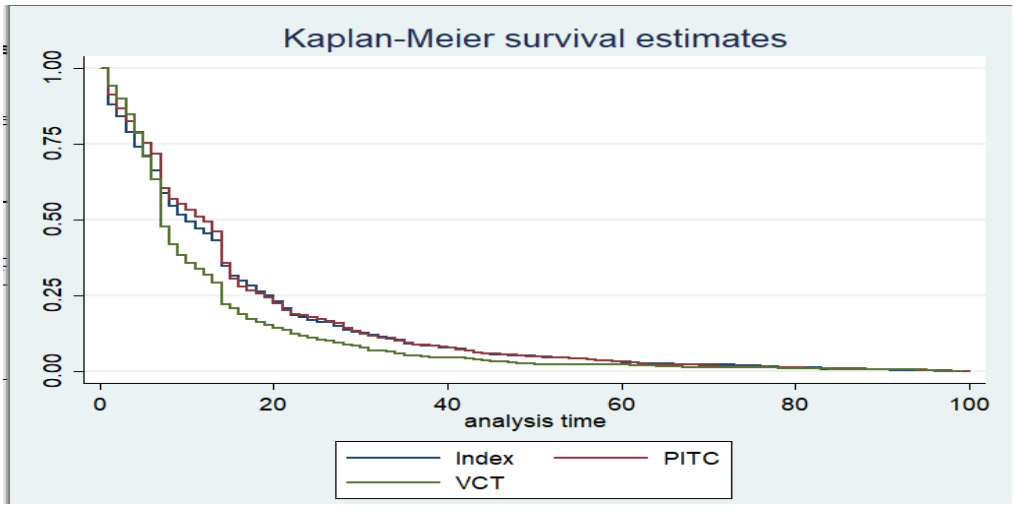
Table 3:Effect of Testing Model on Time to ART Start for clients in CHAK - CHAP Uzima Supported Facilities (October 2017 to March 2022)

Model	***β***	***S.E***	***P-value***	***95% CI***
Community (ref: Facility)	*0.07146*	*0.057*	*0.215*	*-0.04138-0.1843*

Time to ART start by testing approach

The log rank test indicated that the median time to ART start varies significantly by the testing approach (chi=31.54, p<0.001). Those tested through the VCT approach had the shortest time to ART start compared to index and PITC (p<0.001). From Kaplan Meier survival estimates graph, the VCT line appears significantly far from the Index and PITC lines, an indication of shorter time to ART start through the VCT approach.

Figure 3:Kaplan Meier Survival Curves on Time to ART tart by Testing Approach of clients in CHAK - CHAP Uzima Supported Facilities (October 2017 to March 2022)

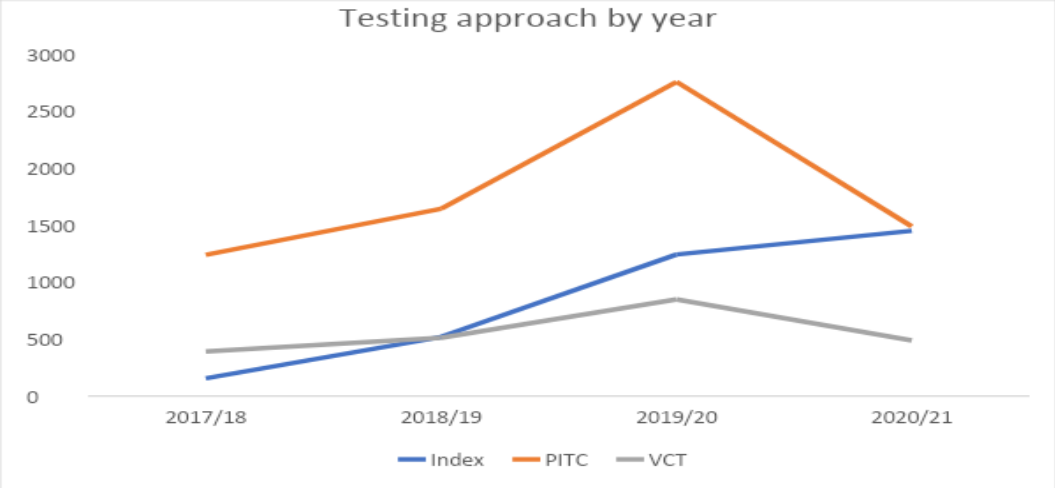


Trend in testing approach

Over the project implementation period, PITC and VCT were the predominant testing approaches in the first two years of implementation (2017 and 2018). With nationwide roll-out of index testing in 2018, there was a significant increase in uptake of index testing across the 78 project supported

health facilities from 2019. The uptake of PITC and VCT was noted to drop in 2020 with a slight dip in index testing in this period.

Figure 4: Trends in Testing Approach of HTS clients in CHAK - CHAP Uzima Supported Facilities (October 2017 to March 2022)

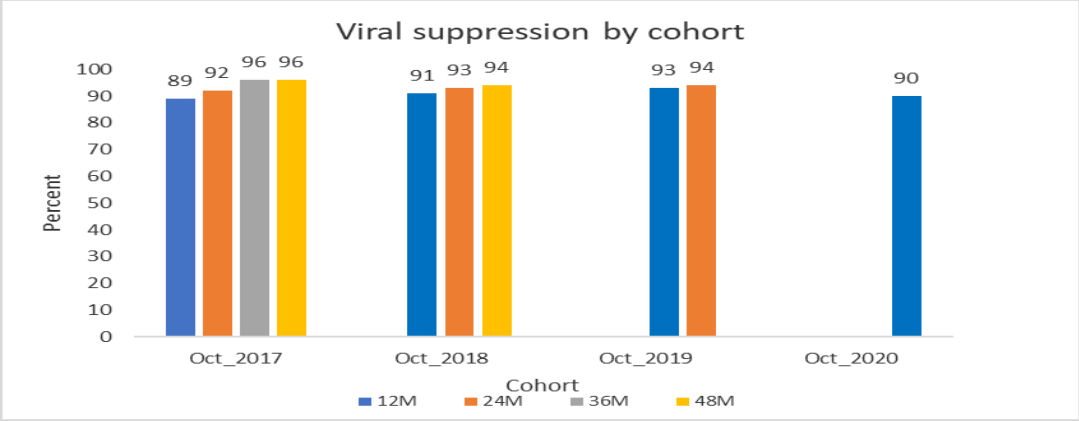


Viral Load Suppression

Viral Load Suppression By Age and Gender

There was notable continuous improvement in viral suppression across the years by the various ART start cohorts. The October 2017 cohort included those identified as positive and initiated on ART between October 2017 and September 2018. Viral Suppression was 89% after 12 months on ART improving to 96% after 48 months on ART. Subsequent cohorts included the periods between October and September of each subsequent project year.

Figure 5:Viral Suppression by Cohort of lients started on ART in CHAK - CHAP Uzima Supported Facilities from October 2017 to March 2022



Viral suppression varied significantly by gender (chi=4.310, p=0.038). Higher proportion of female (94%) were virally suppressed compared to (90%) of the male. Female were almost 2 times more likely to be virally suppressed compared to the male (OR;95%CI: 1.679;1.025-2.751).

Table 4 :Effect of Gender on Viral Suppression for Clients on ART in CHAK - CHAP Uzima Supported Facilities (October 2017 to March 2022)

Model	OR (95%CI)	S. E	P-value
Gender (Female)	1.679(1.025-2.751)	0.423	0.04
Constant	5.097(2.316-11.217)	2.051	<0.001

In addition, there was a significant difference in mean age between those virally suppressed and those not (t=6.707, p<0.001). Clients > 25 years are more likely to be suppressed as opposed to those less than 25 years.

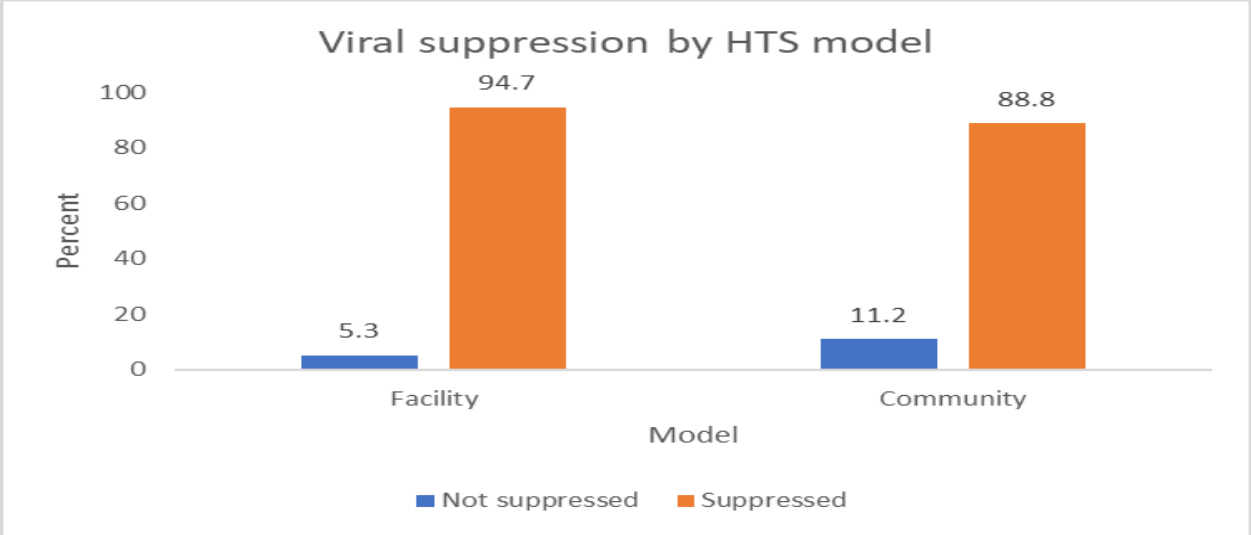
Table 5 :Effect of Age on Viral Suppression for Clients on ART in CHAK - CHAP Uzima Supported Facilities (October 2017 to March 2022)

Variable	**Suppressed**		**t-value**	**P-value**
	No	**Yes**		
Age (in years)	**23.8(SD 17.4)**	**36.3(SD 14.1)**	**6.707**	**<0.001**

Viral suppression by testing model

For clients who had a VL done in Year 5 and had results, a higher proportion of those tested through the health facility 484 (95%) were virally suppressed compared to 143 (89%) of those tested through the community. This was statistically significant (chi=6.8125, p=0.009). The viral suppression by testing model is demonstrated below:

Figure 6 :Viral Suppression by HTS Model for clients on ART in CHAK - CHAP Uzima Supported Facilities (October 2017 to March 2022)



From the simple logistic regression, viral suppression varied significantly by testing model. Those tested through the community model were less likely to be suppressed compared to those tested through the health facility.

Table 6 :Effect of Testing Model on Viral Suppression for Clients on ART in CHAK - CHAP Uzima Supported Facilities (October 2017 to March 2022)

Model	β	S.E	P-value	95%CI
Community	-0.81377	0.319	0.011	-1.4387—0.1888
constant	2.8862	0.1977	<0.001	2.49868-3.2738

Viral suppression by testing strategy

There is a significant difference in terms of viral suppression by the testing strategy (Chi=17.258, p=0.002). All those tested through mobile testing strategy are virally suppressed with the least proportion of those suppressed having been tested through the non-hospital strategy (86%).

Table 7 : Viral Suppression Based on HTS Strategy of clients on ART in CHAK - CHAP Uzima Supported Facilities (October 2017 to March 2022)

Strategy	**Suppressed**		**Chi-value**	**P-value**
	No (%)	Yes (%)		
Home-based	1(7.1)	13(92.9)	17.258	0.002
HTS in VCT	2(3.5)	55(96.5)		
Hospital patient	21(6)	427(95.30		
Mobile testing	0(0)	5(100)		
Non-hospital	21(14.1)	128(85.9)		

From the crude simple logistic regression data, viral suppression did not vary significantly by testing strategy (All p>0.05). This is contrary to the chi-square test results above, which is an indication that there are other factors that may predict viral suppression apart from the testing strategy.

Table 8:Effect of Testing Strategy on Viral Suppression for Clients in CHAK - CHAP Uzima Supported Facilities (October 2017 to March 2022)

Strategy	**β**	**S.E**	**P-value**	**95%CI**
Home based	0.7492	1.2629	0.553	-1.726-3.225
HTS in VCT	0.4473	1.0615	0.673	-1.633-2.527
Hospital patient	-0.7574	1.0641	0.477	-2.843-1.328

Viral suppression by testing approach

All those tested through the VCT approach were virally suppressed compared to those tested through index testing and PITC (chi=5.619, p=0.06).

Table 9 : Relationship Between Viral Suppression and Testing Approach for Clients on ART in CHAK - CHAP Uzima Supported Facilities (October 2017 to March 2022)

Testing Approach	**Suppressed**		**Chi-value**	**P-value**
	No (%)	Yes (%)		
Index	29(8.9)	298(91.1)	5.6198	0.06
PITC	16(4.9)	309(95.8)		
VCT	0(0.0)	21(100)		

Those tested through the PITC approach were more likely to be virally suppressed compared to those tested through the index testing approach.

Table 10 : Effect of Testing Approach on Viral Suppression for clients on ART in CHAK - CHAP Uzima Supported Facilities (October 2017 to March 2022)

Strategy	β	S.E	P-value	95%CI
PITC	0.63095	0.3218	0.05	0.00017-1.2617

Retention

Retention by Age and Gender

Twelve (12) month retention for all cohorts was 80% and above, with a decline to 74% within 24 months. There was a slight improvement in 12- and 24-months retention within the October 2019 and October 2020 cohort however, retention did not vary significantly by gender (chi=1.488, p=0.222

Figure 7: Retention by Cohort of year started on ART of Clients in CHAK - CHAP Uzima Supported Facilities (October 2017 to March 2022).

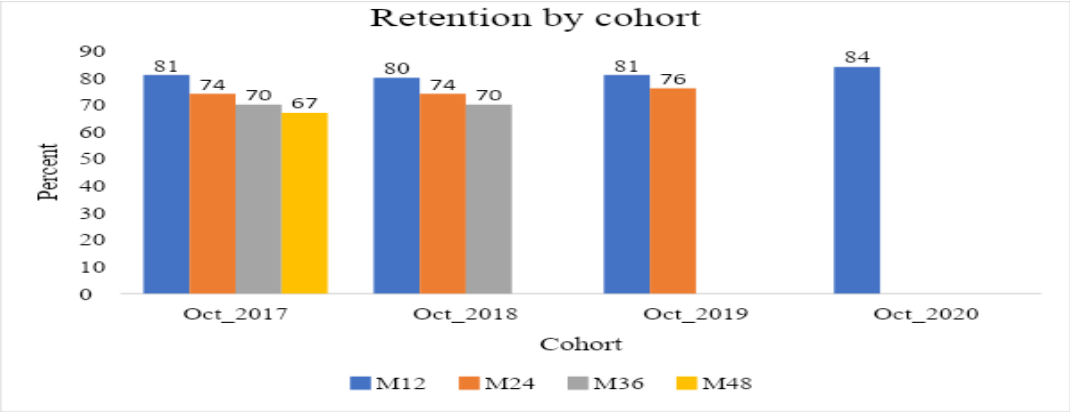


Table 11:Relationship Between Gender and Patient Retention for Clients on ART in CHAK - CHAP Uzima Supported Facilities (October 2017 to March 2022)

Gender	Retention		Chi-value	P-value
	No (%)	Yes (%)		
Male	1294(23.7)	4166(76.3)	1.488	0.222
Female	2478(24.6)	7604(75.4)		

Retention by Age

Similarly, there was no significant difference in mean age between those retained and those not (37.2 (SD 13.0) vs 38.2(SD 13.0), p=1.000)

Retention by testing strategy

Retention varied significantly by testing strategy (chi=100.097, p<0.001). Higher proportion of those retained were tested through home-based testing (84%), HTS in VCT and non-hospital testing (82% each) compared to 75% (hospital patients and mobile testing).

Table 12 : Relationship Between Testing Strategy and Retention for clients on in CHAK - CHAP Uzima Supported Facilities (October 2017 to March 2022)

Strategy	**Retention**		**Chi-value**	**P-value**
	No (%)	Yes (%)		
Home-based	143(16.1)	743(83.9)	100.09	<0.001
HTS in VCT	400(17.8)	1846(82.2)		
Hospital patient	1668(25.5)	4871(74.5)		
Mobile testing	64(25.2)	190(74.8)		
Non-hospital	219(17.8)	1014(82.2)		

In the crude simple logistic regression, those tested through hospital patient and mobile testing strategies were significantly less likely to be retained compared to those tested through home-based strategy ($p<0.001$ and $p=0.001$) respectively.

Table 13 : Effect of Testing Strategy on Patient Retention in CHAK - CHAP Uzima Supported Facilities (October 2017 to March 2022)

Strategy	**β**	**S.E**	**P-value**
HTS in VCT	-0.11854	0.1067	0.266
Hospital patient	-0.57618	0.0956	<0.001
Mobile testing	-0.55971	0.17095	0.001
Non-hospital	-0.11526	0.1179	0.328

Retention by testing approach

Higher proportion of those tested through the index testing approach were retained (84%) compared to those tested through PITC and VCT approaches (73% and 76%) respectively.

Table 14: Relationship Between Testing Approach and Retention of Clients tested and linked to ART in CHAK - CHAP Uzima Supported Facilities (October 2017 to March 2022)

Testing approach	Retention		Chi-value	P-value
	No (%)	Yes (%)		
Index	667(16.2)	3461(83.8)	153.15	<0.001
PITC	1410(26.8)	3851(73.2)		
VCT	422(23.8)	1353(76.2)		

Table 12 below shows that those tested through PITC and VCT approaches were significantly less likely to be retained compared to those tested through the index testing approach.

Table 15 :Effect of Testing Approach on Retention for Clients in CHAK - CHAP Uzima Supported Facilities (October 2017 to March 2022)

Testing approach	β	S.E	P-value
PITC	-0.6412	0.0524	<0.001
VCT	-0.4809	0.0699	<0.001

Discussion

Of 15,555 HIV positive persons identified between 2017 and 2022 through different testing models, (65%) were HIV-positive females and 35% were males respectively. Findings demonstrate that by expanding index testing for adult partners and family members and high-risk associates, the program increased the total positive contribution of PLHIV in need of ART among the cohorts reviewed between 2019 and 2022, who otherwise would not have been identified if services were restricted to other testing models irrespective of the testing setting (community/facility/HIVST). The index increase in new HIV diagnoses is consistent with most index-testing studies in sub-Saharan Africa[15].

Our findings have demonstrated a significant improvement trend in the index testing model, notably the PITC testing model had the highest positive contribution (47.1%) in identifying PLHIV in need of ART among the cohorts reviewed between 2017 and 2022 with VCT contributing 16%.

There was a drop in HIV positive clients identified through PITC and VCT during the 2020 to 2021 period; and this is most likely attributed to COVID 19 effects (reduced outpatient hospital attendance as a result of lockdowns and curfew). CHAP *Uzima* started implementing index testing in 2019 and the number identified using this approach increased overtime as indicated in Figure 4. Eligibility screening and testing among subpopulations at high-risk in this testing approach is a promising strategy to help improve case finding and ART coverage among PLHIV at facility and community setting. Overall, the PITC approach contributed to a higher number of positives compared to the index testing approach.

Excluding social-network testing (a form of respondent-driven recruitment is used to test members of social networks), we did not find significant data that evaluated HIV positive contribution and ART-initiation outcomes among high-risk contacts and acquaintances as this strategy was rolled-out in March 2022.

The 2018 Kenya ART Guidelines recommend test and treat (same day enrollment and linkage to ART), irrespective of whether the HIV test was done at community or facility level. All individuals with confirmed HIV infection are eligible for ART irrespective of CD4 cell levels, WHO clinical stage, age, pregnancy or breastfeeding status, co-infection status, risk group, or any other criteria [16]. From the data analyzed, 70% of all the newly diagnosed HIV positive clients identified between October 2017 and March 2022 were started on ART on the same day of diagnosis. Of those not started within the same day, 66% were started within 14 days, and the remaining were started on ART after 14 days. The guidelines also have special considerations when ART can be delayed, mostly related to diagnosis of opportunistic infections. For instance, clients with newly diagnosed tuberculosis (TB) are recommended to start anti-TB treatment immediately and initiate ART as soon as anti-TB medications are tolerated, preferably within 2 weeks. For those with TB meningitis, it is recommended to consider delaying ART up to 8 weeks. For clients with cryptococcal meningitis, it is recommended to defer ART until after completing 5 weeks of cryptococcal meningitis treatment and symptoms have resolved [16]. It would therefore be important to note the above as causes for delay in start of treatment among those newly identified. This evaluation does not cover the qualitative causes of delay in ART start. This causes can be determined and appropriate action taken to mitigate increased delay in treatment start (> 14 days) outside the confines of aforementioned opportunistic infections. Healthcare worker factors include

lack of urgency to start ART, fear of Immune Reconstitution Inflammatory Syndrome (IRIS) and client factors include concerns over ART initiation, disclosure contributes to delay in start of ART [17] Other factors include stigma, fear of ART side effects, inconvenience of treatment, difficulty in sustaining treatment, amongst others [18].

Of all the newly identified HIV positive clients, 65% were female. This is similar to CHAP *Uzima's c*urrent on ART gender ratio with 85% of those identified tested through the facility model. The facility model in this case included different service delivery points within the facility – outpatient, inpatient, maternity, postnatal and family planning clinics, TB clinics, maternal and child health clinics, child welfare clinics, malnutrition clinics, amongst others. Men had 1.4 times higher odds of presenting to clinic late in the course of HIV infection compared to women. Gender differences have also been observed in other studies with regard to late presentation to the HIV clinic as well as general outpatient health service utilization[19]. Poor health seeking behavior, inclusive of late presentation, are contributing factors to the differences in ART uptake among the genders for those identified within the health facility. The community model includes those identified at community level through various approaches including index testing, mobile outreaches and HIV self-testing outside the health facility. There is no significant difference in time to ART start between newly identified clients tested in the community and in the facility. The median time to ART was 10 days for both facility and community models.

The testing approaches used have significant effect on the time to ART start. Among the three approaches - VCT, PITC and index testing, VCT had the shortest time to ART start ($p< 0.001$), followed by index testing and finally, PITC. Since clients willingly presented for testing, it is likely that the client will accept their status and start ART as soon as possible, as opposed to index and PITC that have a healthcare provider/client initiating the testing process and subsequently start of ART. The PITC approach also has clients diagnosed with opportunistic infections like TB and cryptococcal meningitis that may lead to a delay in start of ART. Barriers to care that might help explain low linkage rates in PITC and index approach were not evaluated. However, during program implementation period, barriers to linkage among identified clients included work-clinic conflict (being too busy with work or family responsibilities), psychological (refusal of service uptake and requesting time related to stigmatization, denial of HIV infection), and concerns about ART side effects and poor outcome of HIV care; similar to well-known barriers to HIV care in

other studies [20]. Notably, the program established a CQI model that provided follow-up linkage services for HIV-positive clients, proactive peer-delivered case management approach including community tracing, escort, cohort support groups and treatment navigation by longitudinal linkage officers and community healthcare workers. This led to achieving ART initiation rates (90%-95%) as recommended of those enrolled into care.

The impact evaluation of the different models of HTS and linkage to ART on treatment outcomes in CHAP *Uzima* supported facilities showed a significant improvement trend of Viral load suppression among the cohorts reviewed between 2017 and 2020. Whereas the Oct_2017 cohort had the most improved viral suppression trend (89% to 96%), notably the 12 month and 24-month viral suppression in all cohorts also had significant improvement. The UNAIDS 95-95-95 target had been achieved and sustained by year 3. This viral suppression improvement trend can be attributed to same day ART initiation with continuous treatment preparation sessions, ART optimization from year 2, case management approach and enrollment of newly identified clients to support groups. Targeted enhanced adherence counseling can be offered to clients with detectable viral load to support viremic clients achieve re-suppression. Recent clinical evidence has affirmed the Undetectable=Untransmissible (U=U) concept where HIV clients who are virally suppressed are less likely to sexually transmit HIV, the messaging of U=U concept needs to be incorporated in routine care and follow-up of the PLHIV [21].

The October 2020 cohort had the lowest viral suppression (90%) due to a countrywide cessation of viral load testing in 2021 thus a poor viral load uptake for the cohort. The clients tested for viral load in this cohort was less than expected. This cohort may be compared with the other cohorts for the viral suppression in year 1 with this limitation in consideration.

Better viral suppression among those tested through facility (95%) was noted compared to those tested through the community (89%). This was significant (chi=6.8125, p=0.009). In addition, clients tested as non-hospital patients and through the index testing approach had a lower viral suppression compared to the PITC and VCT clients. This could be attributed to the client's assumption of being at no or low risk at time of identification; The index testing approach has been majorly implemented through the targeted community testing model whereby the HTS counselors take initiative to notify the partner of the HIV positive identified clients that they are at risk of

acquiring HIV followed by contacting and testing. Those tested through PITC and VCT approaches were more likely to be virally suppressed compared to those through index testing approach.

Although, significant difference in terms of viral suppression by the testing strategy was noted, there are other factors that predict and affect viral suppression among PLHIV; the HCWs can ensure all clients are routinely assessed for adherence coupled with continuous adherence counseling. In addition, cognitive, behavioral and social economic factors affecting adherence to ART to be identified and addressed.

This evaluation checked on retention based on testing strategy and approach. Home–based testing had the highest number of those retained in care at 84%, followed by HTS in VCT and non-patient testing at 82%. Hospital patients and mobile testing were less likely to be retained. For large referral hospitals, patients seeking specialized care may be tested, identified, enrolled then transferred out to other facilities for follow–up. Distances and transportation costs may be responsible for lower retention of in-bound referrals [22]. Among the hospital patients, mortality associated attrition is expected. This may occur especially during late presentation where they are likely to have advanced HIV disease. Any opportunistic infection (history of or active) at ART initiation, and care entry from the inpatient units was predictive of attrition [22].

In terms of testing approach, those tested via index testing were more likely to be retained compared to other testing approaches. With the introduction of index testing, there has been more focused counseling and treatment preparation for newly – identified clients. Contact between the HIV testing counselor and the index client contact is increased as compared to those presenting at VCT or for PITC, based on index testing methodology. This is likely to influence case management and follow – up for the index contact resulting in retention.

Lessons learnt

Findings from program analysis suggest that expanding index testing for adult partners and family members, optimizing testing in PITC and VCT models to subpopulation at high-risk and providing all clients with linkage case management services, will increase identification of PLHIV in need of ART, and ensure that nearly all contacts initiate ART within the recommended days of diagnosis.

Programs may want to further evaluate newly – identified positive clients not started on ART, outside the confines of the discussed opportunistic infections. Other qualitative factors like acceptance of HIV status, treatment literacy including understanding importance and relevance of ART after diagnosis, and prognosis can be explored.

To promote achieving and sustaining viral suppression among the clients identified through community model and index testing approach, targeted support groups for the newly identified clients through index testing can be initiated, focused immediate linkage efforts and longitudinal follow up can be enhanced, treatment preparation sessions and targeted treatment literacy classes can be offered to these clients. The effort in testing and linking contacts of index clients from the HIV testing counsellors can be matched and continued by the clinical team in order to ensure importance of suppression and retention is emphasized for better VL outcomes. This in turn in leads to decreased use of resources (cost, time) in retention activities, as well as cost for the client as there are reduced number of visits to the health facility.

Conclusion

The number of days to ART start is not significantly different between the two models – facility and community. This implies that the testing model does not affect the number of days to start ART, however the testing approach has significant effect on the time of ART start, with VCT having the shortest time to ART, followed by index testing and PITC approach that records the longest time to ART start.

Index testing is a recommended approach and the process influences retention into treatment with increased contact between the contacts and the healthcare worker. However, this does not

automatically translate into suppression. Programs can implement interventions specific to clients identified through index testing to address suppression.

Dissemination

This report will be disseminated during stakeholder engagement meetings and through presentations of abstracts in various forums. The final evaluation report is in alignment with the PEPFAR Evaluation Standards of Practice requirements and will be posted (in English) on a publicly-accessible website (Christian Health Association of Kenya's (CHAKS) website), within 90 days of report clearance.

Budget

This evaluation was conducted in kind by existing project staff and their costs covered in the project's approved personnel budget.

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List of Appendices