Identifying Gaps in the Pediatric Index Testing Cascade in Homa Bay, Kenya

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USG Disclaimer

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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EXECUTIVE SUMMARY

Introduction

Despite significant advances in pediatric HIV treatment, too many children remain undiagnosed and thus without access to lifesaving antiretroviral therapy (ART). It is critical to identify these children and initiate ART as early as possible. The Pediatric-focused Accelerated Case-finding Effort (PACE) initiative was introduced in March 2020 in 30 facilities in 8 sub-counties of Homa Bay, Kenya with the aim to improve HIV case identification in children.

Methods

We report results of an evaluation conducted in 2020-21 to describe pediatric testing coverage through index testing against the backdrop of strategies introduced under the PACE initiative and the COVID-19 pandemic. This evaluation was carried out to describe the pediatric index testing cascade from line listing current ART clients to linkage to treatment for contacts < 15 years of age who tested HIV positive through index testing. Summary statistics have been used to describe the clinical and demographic characteristics of the index cases and their pediatric contacts. Proportions were used to describe the ART clients who had a line-listing completed, and for other steps along the index testing cascade by entry point and in total. Using logistic regression, selected cascade outcomes were evaluated by fitting clinical and demographic characteristics of the study population into multivariate models to determine associations with outcomes of interest.

Results

A total of 799 index client records were reviewed; of whom 592 had contacts documented and 590 had a line-listing and were eligible for the evaluation. The median age of index clients was 32.9 years (IQR: 27.7-38.2). Majority of index clients (87%) were 25 years or older and were female (62%) attending the CCC. Nearly all women in PMTCT/MCH were breastfeeding (90%) and 10% were pregnant. The median time on ART was 5.0 (IQR: 3.0, 7.2) years with majority suppressed in their most recent VL. Among the 590 index clients with a line-listing, 1369 children contacts were identified with a median of 2 (IQR: 1, 3) contacts per index client and a maximum of 6 and 8 contacts at CCC and MCH respectively per index client. Majority of contacts (89.6%) were reached for testing and 95.2% were eligible for testing and nearly all (98%) were tested for HIV. There were 6 contacts who tested HIV positive (5 tested at the PMTCT clinic) with 83.3% linked to HIV care; 1 HIV positive contact identified at the CCC was not linked to treatment. Of the remaining children tested HIV-positive, 3 children were < 1 year of age, 1 was 1 year old, and 1 child was 5 years old.

Conclusion

The findings show that line listing of contacts is very critical for good performance of Index testing cascade. Factors associated with contacts documented and reached were younger age at PMTCT entry.

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ACRONYMS

ART	Antiretroviral Therapy
CCC	Comprehensive Care Clinic
CDC	Center for Disease Control and Prevention
COVID-19	Corona Virus Disease-2019
EGPAF	Elizabeth Glaser Pediatric AIDS Foundation
HIV	Human Immunodeficiency Virus
IQR	Interquartile Range
MCH	Maternal and Child Health
MOH	Ministry of Health
MSM	Men who have Sex with Men
ODK	Open Data Kit
PACE	Pediatric-focused Accelerated Case-finding Effort
PEPFAR	President's Emergency Plan for AIDS Relief
PMTCT	Prevention of Mother to Child Transmission
PNS	Partner Notification Services
RA	Research Assistant
SAS	Statistical Analysis Software
VL	Viral Load
WHO	World Health Organization

BACKGROUND

PACE Initiative

Despite significant advances in pediatric HIV treatment, too many children remain undiagnosed and thus without access to lifesaving antiretroviral therapy (ART). It is critical to identify these children and initiate ART as early as possible. While the children of HIV-infected adults are at higher risk of infection, few access HIV testing services due to missed opportunities in existing case finding programs (1). Testing the family of adult or child 'index' cases can serve as an entry point for identification of children living with HIV not identified through PMTCT program testing. This type of family-based approach to HIV testing and service delivery enables parents and their children to access care as a unit. Such approaches may improve retention and offer a convenient service for families affected by HIV(2). In Kenya, the Pediatric-focused Accelerated Case-finding Effort (PACE) initiative was introduced in March 2020 in 30 facilities in eight sub-counties of Homa Bay, Kenya. Under the PACE initiative, heath system gaps, such as inadequate staffing and limited provider capacity to effectively implement HIV screening and testing strategies, were to be addressed through an increase in personnel, training on procedures and compliance and facilitating implementation of differentiated testing services through provision of transport reimbursement for community-based testing. The emergence of the Coronavirus disease-2019 (COVID-19) impeded full implementation of the intended strategies. Changes were made to comply with guidance from the Ministry of Health (MOH) and later President's Emergency Plan for AIDS Relief (PEPFAR) to restrict tracking for index testing and stop all community-based testing. EGPAF-specific guidance restricted staff from visiting and supporting providers in-person at health facilities. However, the emphasis on pediatric index testing continued and community-based testing eventually resumed in October 2020.

Initial Evaluation

In 2020, an evaluation was conducted to describe pediatric testing coverage through index testing against the backdrop of strategies introduced under the PACE initiative and the COVID-19 pandemic. Data were collected from eight sites in Homa Bay County in August-October 2020. Data were abstracted from clinic records of ART clients in care in March-June 2020 or died in

2018-2020 and had a line listing to identify contacts <15 years. Data collected included cascade outcomes (contacts reached, HIV tested) and index/contact characteristics: age, sex, testing entry point (HIV, PMTCT), index type (pediatric, sibling), and index time since ART initiation. Cascade data were summarized and logistic regression was used to determine factors associated with outcomes.

Of 632 index clients (87% female, median age 33 years), 1390 contacts were identified from parents and siblings (51% female, median age 9 years). Overall, 87% (1205) of contacts were reached, 77% (928/1205) were eligible for testing, 99.7% (925/928) were tested and 0.9% (8/925) tested HIV-positive; all 8 were linked to treatment. However, this evaluation did not initially assess the rate of line listing. To address this, an additional component was added to the evaluation. A random sample of 50 records each (25 from PMTCT, 25 from the HIV clinic) in 5 of the 8 sites was reviewed to assess how many clients underwent line-listing. 69% (173/250) of clients from the separate sample had no line-listing. Median age from this second sample was 32 years, 95% female, but demographic data was only available for a subset (42/250, 17%). After adjusting for clustering and controlling for other factors, none were significantly associated with line listing. (There were also no significant associations with factors for the other outcomes assessed from the original sample, contacts reached nor contacts tested.) However, we did not have complete individual-level data on characteristics of those with and without a line-list to fully describe and analyze characteristics that may be associated with this outcome, including whether or not the client had children < 15 years of age, and thus be eligible for a line-list per study eligibility criteria. Moreover, the time period from which data were abstracted (March – June 2020) took place at the start of the pandemic (March 2020), which may not accurately reflect more recent service delivery.

Rationale

For the reasons above, a similar evaluation was designed from a later time period to capture more complete individual-level data, to provide a more recent picture of the fidelity with which index testing procedures were followed and to better describe any characteristics associated with having a completed line listing. The evaluation described in this report also took place in a subset of the initial 30 PACE sites and aimed to describe the pediatric index testing cascade from

line listing of current ART clients to linkage to treatment for contacts < 15 years of age who tested HIV positive through index testing.

METHODOLOGY

Study Design

This is a retrospective cross-sectional study of routinely collected individual-level clinical program data.

Study Objectives

1. To describe the proportion of index ART clients at maternal, newborn and child health (MNCH) clinic and comprehensive care clinic (CCC) entry points with a line listing conducted for any biological pediatric contacts <15 years of age.

2. To describe the following index testing cascade among index clients with a line listing conducted:

    a) Of the contacts identified, the proportion that was not reached
    b) Of the contacts reached, the proportion that was not eligible for testing
    c) Of the eligible contacts, the proportion that was tested for HIV
    d) Of the contacts tested for HIV, the proportion that tested HIV positive
    e) Of the contacts who tested HIV positive, the proportion who were initiated on ART

3. To describe demographic and clinical factors of index clients (e.g., age, sex, entry point, marital status, time since HIV diagnosis) and their pediatric contacts (e.g., age, sex, relationship to index client) by the outcomes above (line listing, reached/not reached, eligibility, HIV status, linkage to treatment).

Study Population

The study population was defined as all HIV positive clients who were currently on treatment as of December 31, 2020 and receiving Prevention of Mother to Child Transmission (PMTCT) or HIV care and treatment services at one of the PACE facilities, and their identified pediatric contacts 0-14 years of age. Clients currently in care may be an index for their biological children and/or sibling contacts.

Study Setting

For this evaluation, a subset of eight facilities were included from 25 of the initial 30 PACE sites (5 facilities were excluded from the selection as they had been included in the earlier evaluation). One facility from each of the 8 sub-counties in Homa Bay implementing the PACE initiative was randomly selected with replacement, where a randomly selected facility was placed back into the pool of facilities for the next round of random selection, to help ensure representativeness among different types of health facilities. As such, 3 hospitals, 2 health centers and 3 dispensaries were selected for inclusion in the study (Table 1).

Table 1: PACE Evaluation sites, number of adult and pediatric ART clients on treatment (October-December 2020),

No	Sub-county	Site Name	# of ART clients (adult, pediatric)
1	Suba	Suba District Hospital	3173
2	Kabondo Kasipul	Ober Health Centre	952
3	Rangwe	Ngegu Dispensary	1619
4	Ndhiwa	Ndhiwa District Hospital	2426
5	Mbita	Young Generation Centre Dispensary (Med 25)	852
6	Rachuonyo North	Miriu Health Centre	1233
7	Homa Bay Township	Miniambo Dispensary	1039
8	Rachuonyo South	Matata Nursing Hospital	1631

Sample Size Calculation

The sample size was calculated based on objective 1, to determine the proportion of index ART clients with a line listing conducted for their biological children and siblings below 15 years. Based on the previous evaluation, this rate was 69%. To reach a precision of between 0.03 and 0.04, we aimed to have 70-100 records sampled from each site.

Table 2: Sample size calculation, (October-December 2020), PACE evaluation

		Precision			
		0.02	**0.03**	**0.04**	**0.05**
Proportion without a line-list	**0.50**	2401	1068	601	385
	0.55	2377	1057	595	381
	0.60	2305	1025	577	369
	0.65	2185	972	547	350

	0.70	2017	***897***	***505***	323
	0.75	1801	801	451	289
	0.80	1537	683	385	246

Data Collection

Data were abstracted in May and June 2021 by trained research assistants (RAs). A sample of approximately 100 files per study facility was randomly selected: about 50 from the MCH clinic of pregnant and breastfeeding women of children ≤ 18 months of age, and about 50 from pediatric and adult clients receiving services in the ART clinic. An additional list of 20 randomly selected numbers were provided to replace any of the original 100 in the case that any of the client files could not be located or who did not meet study eligibility criteria. Study eligibility criteria was defined as any ART client currently in care (having attended ≥ 1 clinic visit between July and December 2020) and receiving HIV services at a PMTCT or HIV clinic at a PACE study site. Source documents included client files at CCC and MCH clinics, the Partner Notification Services (PNS) and family testing registers and the family tree table.

For all selected index client files, demographic and HIV clinical background information was abstracted and whether or not they had a completed family tree table with their family members documented. This latter step was meant to determine if was a line list was conducted; i.e., if the client had no biological children/siblings < 15 years, then they would not be defined for the purposes of the study as missing a line-list. If there was more than one index visit within the 6-month timeframe, the information at the most recent visit was included (e.g., for pregnancy status, ART regimen, HIV WHO staging, viral load (VL) result). For each of the files selected for abstraction, data were captured on whether the client had their contacts line-listed. If so, data on the line-listed contacts who were less than 15 years of age were abstracted. This included demographic data and their completion of steps along the index testing cascade: reached, eligibility for HIV testing, HIV testing, and ART initiation, as applicable. Data were collected using a data collection tool structured in Open Data Kit-X (ODK-X) and uploaded onto electronic tablets. All RAs were trained on the protocol, specific Standard Operating Procedures (SOPs) and the data collection tool prior to data collection. In addition, all research staff involved in data collection

were trained on research ethics, including handling patient information. All staff signed a confidentiality agreement and had an up-to-date Research Ethics Certificate.

To assure data quality, the electronic data collection tool was designed with validation procedures within. Furthermore, the team was trained on specific data management and data quality SOPs. Data were routinely reviewed by the data manager and inconsistencies shared with the data collection team for redress. The data were stored securely within EGPAF servers with access restriction.

Data Analysis

Proportions were used to describe the ART clients who had a line-listing completed, and for other steps along the index testing cascade (e.g., contacts reached, eligible, tested, etc.) by entry point and in total. Summary statistics, such as frequencies, median and inter-quartile range (IQR), were used to describe the clinical and demographic characteristics of the index cases and their pediatric contacts. Using logistic regression, selected cascade outcomes were evaluated by fitting clinical and demographic characteristics of the study population into multivariate models to determine which factors are associated with the outcomes of interest. Data were analyzed using SAS version 9.4.

Stakeholder Engagement

EGPAF worked closely with various stakeholders throughout the course of the evaluation. The County Director of Health and County and sub-county health management teams (S/CHMT) were involved at the formation of the intervention. S/CHMTs and Health Care Workers supported and supervised data collection.

Ethical Considerations

This evaluation was implemented as part of the Patient and Program Outcome Protocol (PPOP), approved by Kenyatta National Hospital-University of Nairobi-Ethical Review Committee (KNH-UoN ERC), CDC (ADS) and Advarra Institutional Review Board (IRB) in the United States. It was also reviewed in accordance with the U.S. Center for Disease Control and Prevention (CDC)

human research protection procedures and was determined to be research, but the CDC investigators did not interact with human subjects or have access to identifiable data or specimens for research purposes.

RESULTS

Overall Cohort Description

A total of 799 records were reviewed for the PACE study. 207 records did not meet study criteria; 158 had no family members documented, and 49 were ART clients who had family members documented but did not meet the age requirement for children or siblings (<15 years). Of the 207, 138/183 records from CCC and 20/24 from MCH/PMTCT clinics, did not have family members documented. Most of the clients with contacts documented and who met study criteria were parents with one or more biological children (573/592). Only two index clients had contacts documented in the family tree table, but had no line-list. One client was a 21-year-old pregnant woman and the other was identified as MSM (men who have sex with men).

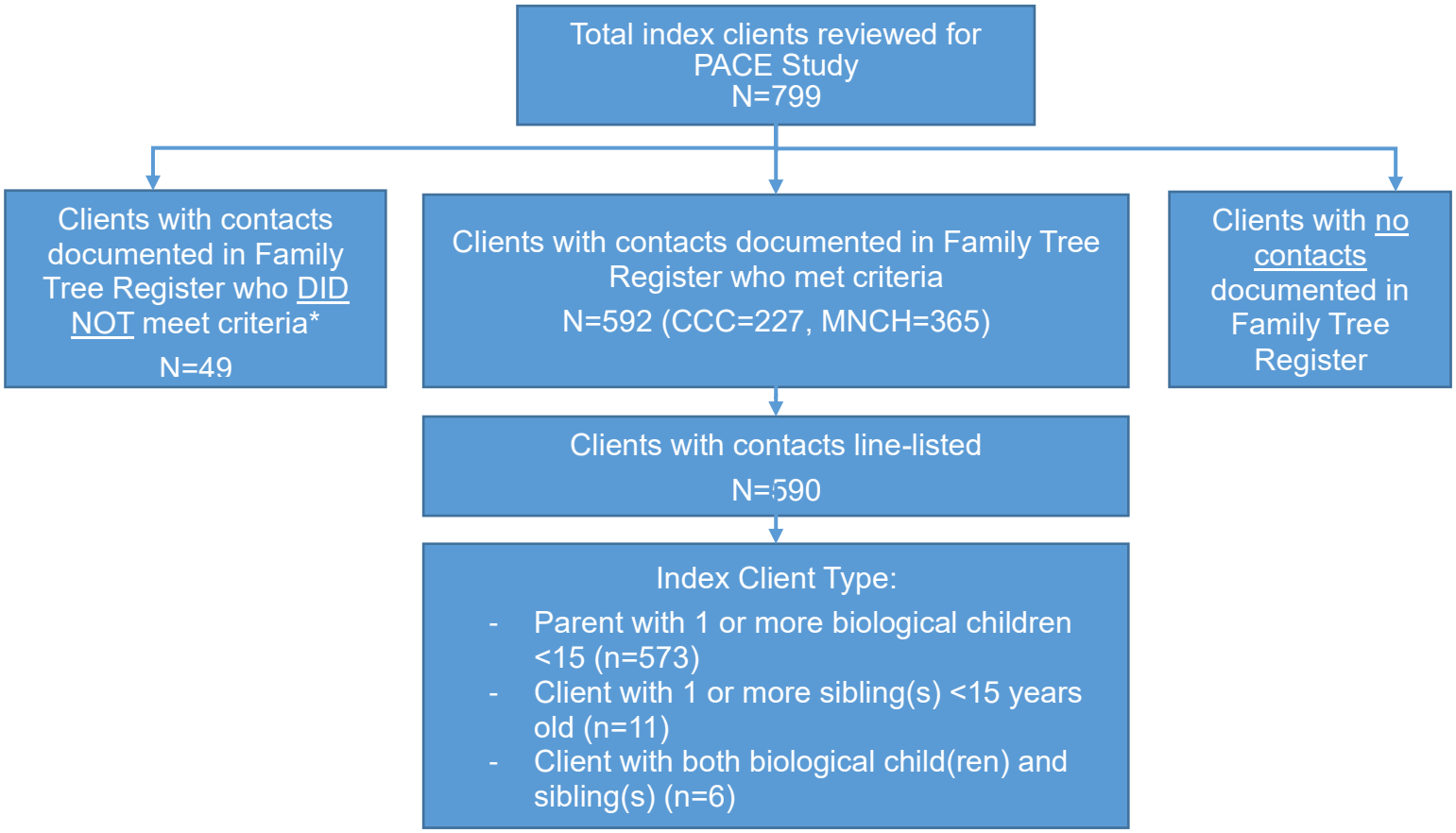

Figure 1. Records screened and enrolled into the evaluation, (October-December 2020), PACE evaluation

Index Client Profiles

The overall median age of index clients was 32.9 years (27.7-38.2) (Table 1). CCC clients were a median of about 8 years older than PMTCT clients. The majority of clients with line- lists conducted (87%) were 25 years and above. The majority (62%) of the indexes were females who attended the CCC. Most women in PMTCT/MCH were breastfeeding (90%) versus 10% who were pregnant. The median time on ART was 5.0 (3.0-7.2) years. All those whose records were sampled had a suppressed VL, though a quarter of the results were missing. VL results were only included if they were collected within a year of their last clinic visit during the study period.

Table 1. Index client demographics and HIV related history, among those with contacts documented, (October-December 2020), PACE evaluation

	CCC (n=227)	MCH (n=365)	Total (n=592)
Index client age at last clinic visit in study period, median (IQR)	38.4 (33.3-45.4)	30.3 (26.4-34.0)	32.9 (27.7-38.2)
Index client age			
< 15 years	5 (2.2)	-	5 (0.8)
≥ 15 - < 25 years	9 (4.0)	63 (17.3)	72 (12.2)
≥ 25 years	213 (93.8)	302 (82.7)	515 (87.0)
Sex			
Female	141 (62.1)	365 (100.0)	506 (85.5)
Marital status*	**204**	**323**	**527**
Single	5 (2.2)	33 (9.0)	38 (6.4)
Married (mono)	118 (52.0)	193 (52.9)	311 (52.5)
Marriage (poly)	43 (18.9)	66 (18.1)	109 (18.4)
Living with partner/cohabitating	2 (0.9)	-	2 (0.3)
Separated/Divorced	12 (5.3)	12 (3.3)	24 (4.1)
Widowed	24 (10.6)	19 (5.2)	43 (7.3)
Pregnant or breastfeeding			
Pregnant	N/A	38 (10.4)	38 (6.4)
Breastfeeding	N/A	327 (89.6)	327 (55.2)
Eligible contacts line listed			
Yes	226 (99.6)	364 (99.7)	590 (99.7)
No	1 (0.4)	1 (0.3)	2 (0.3)
Index type			

Parent with 1 or more biological children, <15 years old	217 (95.6)	356 (97.5)	573 (96.8)
Index client with 1 or more sibling(s), <15 years old	6 (2.6)	5 (1.4)	11 (1.9)
Parent with 1 or more biological children, <15 years old **AND** Index client with 1 or more sibling(s), <15 years old	3 (1.3)	3 (0.8)	6 (1.0)
Missing (the two without a line list)	1	1	2
Time since HIV diagnosis, in years, median (IQR)	6.1 (3.9-9.4)	4.8 (2.2-7.3)	5.3 (3.0-8.1)
Age at HIV diagnosis	32.3 (27.0-38.4)	24.7 (21.2-28.2)	26.9 (22.8-32.0)
Time since ART initiation, in years, median (IQR)	5.8 (3.7-8.9)	4.7 (2.2-6.6)	5.0 (3.0-7.2)
Age at ART initiation	32.6 (27.2-38.4)	25.1 (21.9-28.6)	27.2 (23.1-32.4)
Current ART regimen			
TDF+3TC+DTG	199 (87.7)	337 (92.3)	536 (90.5)
Other DTG-based ART	3 (1.3)	2 (0.6)	5 (0.8)
EFV-based ART	14 (6.2)	11 (3.0)	25 (4.2)
NVP-based ART	-	-	-
LPV/r-based ART	1 (0.4)	2 (0.6)	3 (0.5)
ATV/r-based ART	9 (4.0)	13 (3.6)	22 (3.7)
DRV/r-based ART	1 (0.4)	-	1 (0.2)
Last clinic visit (from date of data collection)			
< 3 months (Oct – Dec 2020)	171 (75.3)	339 (92.9)	510 (86.2)
≥ 3 – 6 months (July-Sep 2020)	56 (24.7)	26 (7.1)	82 (13.9)
Most recent VL result**			
Undetectable (LDL)	118 (52.0)	211 (57.8)	329 (55.6)
Detectable, suppressed (<1,000c/ml)	52 (22.9)	79 (21.6)	131 (22.1)
Unsuppressed (≥1,000c/ml)	-	-	-
Missing	57	75	132
Median time since last VL collection, in months, median (IQR)	3.2 (0.0-8.9)	2.8 (0.0-5.2)	3.0 (0.00-7.0)
Missing	27	60	87
Most recent WHO stage**			
Stage I	170 (74.9)	255 (69.9)	425 (71.8)
Stage II	44 (19.4)	61 (16.7)	105 (17.7)
Stage III	7 (3.1)	7 (1.9)	14 (2.4)
Stage IV	2 (0.9)	1 (0.3)	3 (0.5)
Missing	4	41	45

*Marital status not included for children/adolescents < 18 years

**Any WHO stage or VL data that was recorded more than a year prior to the last clinic visit were recoded to missing. This impacted 10 WHO Stage values and 70 viral load values.

Pediatric Contacts and Index Testing Cascade

Of the index clients, 20% (158/799) had no family members documented; and therefore, we could not determine biological children/siblings <15 years; 639/799 (80.0%) had biological children and siblings documented. Among the 590 index clients with a line-listing who met study eligibility criteria, 1369 contacts were identified from children and siblings.

Table 2 shows the pediatric contact demographics and cascade outcomes by entry point. Slightly less than half of the contacts (46%) were less than 5 years of age. For both entry points, a median of 2 (1-3) contacts per index client were line-listed; there was a maximum of 6 (CCC) and 8 (MCH) contacts. No pregnancies were reported among contacts. Reasons for ineligibility were not documented in the registers; however, we did ascertain from the records that 21 of the children had previously tested HIV-positive.

Table 2. Contact demographics and cascade outcomes, by entry point, (October-December 2020), PACE evaluation

	CCC N=529	PMTCT/MCH N=840	Total N=1369
Contact age at time of line list n, median (IQR)	528, 7.0 (4.0-11.0)	839, 3.0 (1.0-8.0)	1367, 5.0 (1.0-10.0)
< 5 years	145 (27.4)	484 (57.7)	629 (46.0)
≥ 5 - <10 years	201 (38.1)	194 (23.1)	395 (28.9)
>10 - 14 years	182 (34.5)	161 (19.2)	343 (25.1)
Missing	1	1	2
Sex			
Female	244 (46.1)	408 (48.6)	652 (47.6)
Relationship to index client			
Pediatric Contact	505 (95.5)	826 (98.3)	1331 (97.2)
Sibling Contact	24 (4.5)	14 (1.7)	38 (2.8)
Testing cascade, N (%)			
Contacts reached*	441 (83.4)	786 (93.6)	1227 (89.6)
Contacts eligible for testing*	420 (95.2)	763 (97.1)	1183 (96.4)
Contacts tested for HIV	408 (97.1)	750 (98.3)	1158 (97.9)
Contacts testing HIV+	1 (0.3)	5 (0.7)	6 (0.5)
Contact linked to HIV care	-	5 (100)	5 (100)

*1 contact was missing information on whether or not they were reached.

For the index testing cascade, as documented in Table 2 above, 20% of our sampled records did not have family members documented so they are not reflected in Figure 2 below. For those with line-listing conducted, the majority (95.2%) of contacts were eligible for testing and nearly all (98%) eligible contacts were tested for HIV. The largest gap was the 11% of children not reached for testing. There were six contacts who were tested; five were identified in the PMTCT clinic. One HIV positive contact identified through an index client in the CCC was not linked to treatment; and their exact age was missing from clinic records. Of the remaining children testing HIV-positive, 3 children were < 1 year of age, 1 child was 1 year old, and 1 child was 5 years old.

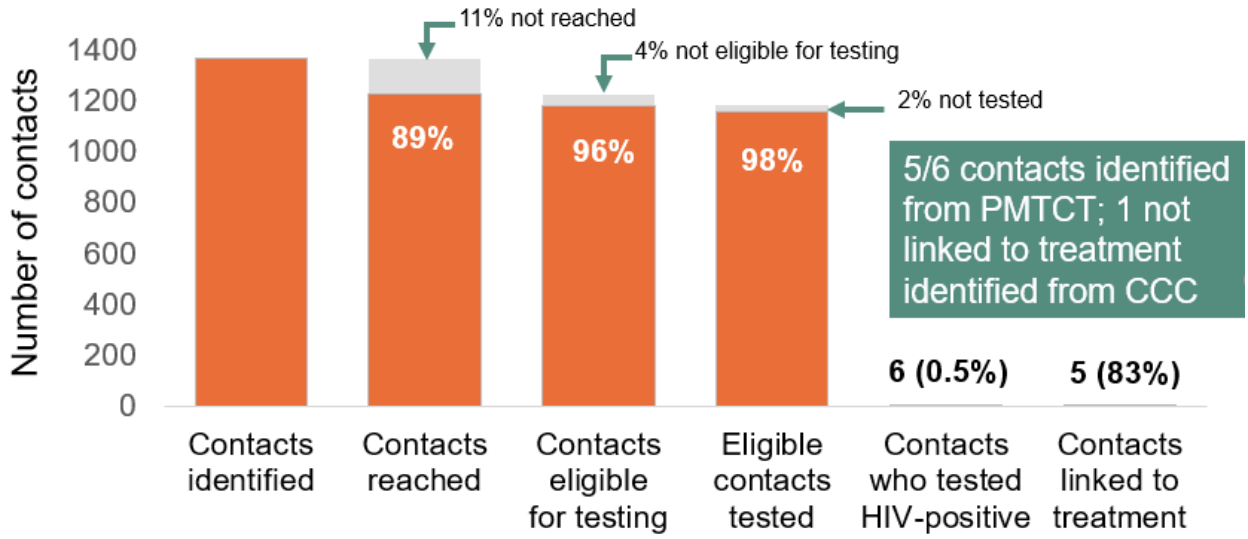

Figure 2. Pediatric index testing cascade (n=1369), (October-December 2020), PACE evaluation

Multivariate Analysis of Outcomes

For the two largest cascade gaps, we explored possible associated factors for poor documentation of contacts and contacts reached. For documentation, this included all sampled index clients: 592 with contacts <15 years and 49 with contacts ≥15 years documented in the family tree register (n=641) compared to 158 indexes with no documented contacts. Variables included in the model were: index age, sex, entry point, marital status, time since ART initiation,

and HIV WHO stage. Only the PMTCT entry point with an Adjusted Odds Ratio (AOR) of 7.21 (95% Confidence Interval [CI] 4.16-12.47) was associated with having contacts documented.

Table 3. Unadjusted and Adjusted Odds Ratios for Documentation of Contacts Outcome, (October-December 2020), PACE evaluation

	Contacts documented (N=641)	Contact not documented (N=158)	P-value	Unadjusted OR	Adjusted OR[%]
Age (n, median, IQR)*	641, 33.4 (28.0-38.6)	158, 38.6 (30.4-50.3)	<0.0001	0.96 (0.95-0.98)	
Age					
< 15 years	10 (1.6)	4 (2.5)	0.570	0.60 (0.18-1.93)	
≥ 15 - < 25 years	74 (11.5)	21 (13.3)		0.84 (0.50-1.42)	
25 years and above	557 (86.9)	133 (84.2)		*ref*	
Sex*					
Male	102 (15.9)	64 (40.5)	<0.0001	*ref*	*Ref*
Female	539 (84.1)	94 (59.5)		3.60 (2.46-5.27)	1.54 (0.97-2.44)
Entry point*					
CCC	272 (42.4)	138 (87.3)	<0.0001	*ref*	*Ref*
MCH/PMTCT	369 (57.6)	20 (12.7)		9.36 (5.71-15.35)	7.21 (4.16-12.47)
Marital status*					
Partner	442 (78.0)	99 (70.2)	0.053	1.50 (0.99-2.27)	1.44 (0.91-2.28)
No Partner	125 (22.0)	42 (29.8)		*Ref*	*Ref*
Time since ART initiation (n, median, IQR)	641, 5.1 (3.1-7.3)	157, 5.4 (1.6-8.5)	0.630	1.01 (0.96-1.06)	
HIV WHO stage*					
Stage I/II	575 (96.8)	140 (92.7)	0.020	*ref*	
Stage III/IV	19 (3.2)	11 (7.3)		0.42 (0.20-0.90)	

*included in backwards regression multivariate model
[%]retained in backwards regression multivariate model (at 0.2) – p-value of model = <0.0001

For contact outreach outcome analysis, this included all index clients (n=590) who contributed contacts and contacts <15 years (n=1369). Variables included in the model were index age, sex, entry point, marital status, HIV WHO stage, time since ART initiation and child age, sex, and relationship to index client. Only the PMTCT entry point with an AOR of 2.12 (95% CI 1.18-3.84) and child age < 5 years with an AOR of 0.47 (95% CI 0.31-0.72) was associated with reaching the contacts.

Table 4. Unadjusted and adjusted odds ratios for documentation of contacts reached, (October-December 2020), PACE evaluation

	Contact not reached (N=142)	Contact reached (N=1227)	Total (N=1369)	P-value	Unadjusted OR	Adjusted OR[%]
Index age*[%]						
< 15 years	12 (8.5)	6 (0.5)	18 (1.3)	<0.0001	0.13 (0.02-0.81)	0.16 (0.02-1.33)
≥ 15 - < 25 years	8 (5.6)	93 (7.6)	101 (7.4)		1.20 (0.53-2.74)	0.68 (0.29-1.60)
25 years and above	122 (85.9)	1128 (91.9)	1250 (91.3)		*Ref*	*Ref*
Index sex*[$]						
Male	42 (29.6)	177 (14.4)	219 (16.0)	<0.0001	*Ref*	
Female	100 (70.4)	1050 (85.6)	1150 (84.0)		2.54 (1.39-4.64)	
Index entry point*[%]						
CCC	88 (62.0)	441 (35.9)	529 (38.6)	<0.0001	*Ref*	*Ref*
MCH/PMTCT	54 (38.0)	786 (64.1)	840 (61.4)		3.49 (2.10-5.80)	2.12 (1.18-3.84)
Index marital status						
Partner	102 (85.0)	908 (81.9)	1010 (82.2)	0.400	0.97 (0.49-1.90)	
No Partner	18 (15.0)	201 (18.1)	219 (17.8)		*Ref*	
Index HIV WHO stage						
I/II	136 (97.1)	1123 (97.4)	1259 (97.4)	0.860	*Ref*	
III/IV	4 (2.9)	30 (2.6)	34 (2.6)		0.65 (0.18-2.36)	
Index time since ART initiation* (n, median, IQR)	142, 3.8 (1.8-6.6)	1227, 5.3 (3.5-7.2)	1369, 5.2 (3.4-7.1)	0.004	1.01 (0.99-1.01)	
Child age (dichotomous)* [%]						
Under 5	45 (31.7)	584 (47.7)	629 (46.0)	0.0003	*Ref*	*Ref*
5 or older	97 (68.3)	641 (52.3)	738 (54.0)		0.49 (0.33-0.70)	0.47 (0.31-0.72)
Child sex						
Male	83 (58.5)	634 (51.7)	717 (52.4)	0.130	*Ref*	
Female	59 (41.5)	593 (48.3)	62 (47.6)		1.11 (0.82-1.51)	
Child relation						
Child	129 (90.8)	1202 (98.0)	1331 (97.2)	<0.0001	*Ref*	
Sibling	13 (9.2)	25 (2.0)	38 (2.8)		0.55 (0.21-1.46)	

*included in backwards regression multivariate model
$removed from the multivariate model as it did not retain significance at a 0.2 level for inclusion/retention in the multivariate model
[%]retained in backwards regression multivariate model (at 0.2)

Discussion

Findings from this evaluation indicate fairly high index testing cascade performance once contacts have been line-listed. The yield in this family-based index testing was at 0.5%. A similar UNICEF -led family-based index case testing initiative in the Democratic Republic of Congo (DRC) and Zimbabwe, report very high yield at 30% in DRC, while in Zimbabwe, yield was lower at 3%. This difference highlights the importance of context, and is likely driven by PMTCT

coverage and early infant diagnosis coverage. It may also be due to and the difference between the programs in terms of maturity (3,4).

Outreach was the primary gap as 11% of contacts were not reached for eligibility screening and HIV testing. Outreach could have been affected by the ongoing COVID-19 pandemic. Fear of exposure or movement restrictions may have impacted clinic visits with children. Also, household visits by community health workers did not restart until around the mid-point of this evaluation in October 2020. While nearly all index clients with family members documented were line-listed, 20% of the sampled records had no family members documented, and therefore, it was not possible to determine if there was a line list for biological children and siblings < 15 years of age. Therefore, performance on line-listing is inconclusive, but we can conclude that there is poor completion of the family tree register to inform this process. There were only six children diagnosed with HIV as part of this sample; four of whom were 2 years of age and likely identified in the PMTCT program.

In addition to describing the index testing cascade, this study also explored demographic and clinical factors of index clients and their pediatric contacts by selected cascade outcomes that had sufficient numbers for comparison. Index clients from PMTCT/MCH were significantly more likely to have their contacts documented and reached for testing than those from CCC. Moreover, over half of contacts identified were 5 years of age and above (54%), although they were significantly less likely to be reached for testing than younger children.

Other factors were not found to be associated with cascade outcomes. It should be noted as a potential limitation that we may have found reasonable fidelity to the cascade and few undiagnosed HIV positive children because we only sampled from clients currently on ART, defined as those who had a clinic visit in the last 6 months. All indexes with recent VL data available were unsuppressed and some of their pediatric contacts had already been diagnosed with HIV. Findings may have been different with a different study population, for instance those without a recent visit or those identified in the community, and not from a health facility sample.

As the aim of this study was to describe the index testing cascade and factors associated with outcomes following implementation of the PACE initiative, the study was not designed to estimate the effect of the PACE initiative itself. We did observe an increase in line-listing from the initial evaluation to this one in which nearly all index clients were line listed. However, we cannot attribute this change to PACE. As we note above, we could not determine based on the available routine data collected, whether clients without a line list should have had one (i.e., had undiagnosed children < 15 years) or they did not have a line list because they were ineligible (e.g., no children < 15 years). In the current evaluation, we addressed this by first reviewing each index's family tree table with their family members documented, and then reviewing their file for a line list meeting study eligibility criteria.

Limitations

This evaluation has a couple notable limitations. One, the accuracy and completeness of routinely collected data from records was variable, particularly on some client characteristics and reasons for gaps in the cascade. While part of the overall PACE initiative was to strengthen documentation practices, we had to accept a lower level of quality than what we could expect if we were collecting primary data. Secondly, given the advent of the COVID-19 pandemic during the data collection period, and the resulting scale-down of activities, we were not able to detect as great of a difference as may be expected under different conditions. However, in addition to evaluating the effect of PACE strategies, this evaluation was also an opportunity to document the pediatric testing coverage during the time when HIV testing services overall were significantly limited due to COVID-19.

CONCLUSION

In conclusion, following the implementation of the PACE initiative, about 80% of the clients had family members line-listed. Of those line-listed, the majority were eligible for HIV testing and nearly all were tested. The yield was at 0.5%. The findings show that line listing of contacts is very critical for good performance of Index testing cascade. Factors associated with contacts documented and reached were younger age at PMTCT entry. However, there is lack of fidelity

to completion of the family tree register. Documentation of processes is also a challenge, making it difficult make conclusions on performance on line-listing.

KEY TAKE AWAYS

This section identifies actions to be considered based on the results presented from this evaluation.

1. **Pediatric case finding efforts at CCC could be strengthened, starting with documentation of family members for all index clients as standard practice.** In this evaluation, it was difficult to determine if line listing and testing opportunities were missed for clients without complete family tree registers.

2. **Standardize use of existing facility and community tools and improve provider practices to better capture process-related information.** Reasons children were not reached for HIV testing or identified as ineligible were not documented in existing registers and could not be reported for this evaluation. More contextual information will provide a better understanding of individual-level barriers (e.g., children at school and unavailable at home on weekdays; non-disclosure in sero-discordant couple and mother resisting household visit) and inform outreach approaches. This could help to improve outreach among older children, a well-recognized gap found in this evaluation. More comprehensive and consistent documentation could also facilitate information-sharing across clinic and community providers contributing to pediatric case finding efforts.

3. **Focus on index testing for clients defaulting from care.** As this study included current index clients only, programs may want to review the records for and emphasize line listing for defaulters reengaging in care and as part of community tracing activities for clients who have missed visits.

4. **Evaluations with primary data collection designs will help provide a more complete understanding of risk factors associated with undiagnosed pediatric HIV.** As this study

relied on facility-based clinic records, as above, we could not determine if index clients were eligible for line listing and did not have access to more contextual information for cascade gaps, such as contact outreach. Use of exit surveys or community recruitment approaches to engage clients not currently in care could address some of the limitations of this evaluation.

Dissemination

The findings have been disseminated in the County to the CHMT, HCWs and other implementing partners in the county. These findings have also been presented to Representatives from CDC were also present during the dissemination meeting The final report will be shared with CHMT and partners

Dissemination plan

	Target Audience	Action Point	Channel of Communication	Time and Place
1	CHMT, Facility In-charges, health care workers	Share evaluation findings and key recommendations to strengthen program implementation	Power point presentation Virtual meeting	October 2021
2	OGAC, CDC and USAID Working Group	Use of information to inform COP guidance; disseminate same results at upcoming webinar on pediatric index testing (see below)	Power point presentation Virtual meeting	October 2021

3	International group of programmers, policy-makers and researchers	N/A (information sharing)	WHO/TeleECHO Webinar	December 2021
4	NASCOP, County Director of health, CASCO	Submit signed copies of the report	Report	October 2022

References

1.UNAIDS. 2018. Global HIV & AIDS statistics — 2019 fact sheet. Available from: https://www.unaids.org/en/resources/fact-sheet

2. PEPFAR. *Partner and Family-Based Index Case Testing: A Standard Operating Procedure*. <https://aidsfree.usaid.gov/sites/default/files/pn_ _slides.pdf>.

3. UNICEF annual results report: https://www.unicef.org/publications/index_96412.html.

4. WHO-CDS-HIV-19.24-eng.pdf. Shaffiq Essajee, Nande Putta, Serena Brusamento, Martina Penazzato, Stuart Kean and Daniella Mark. Family-based index case testing to identify children with HIV.

Budget

The cost of data collection was USD 10,980

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Appendices

1. Pace Evaluation plan
2. PACE Data Collection Tool
3. Investigator CVs and Ethics Training Certification

PACE Data Tool_06May2021.xls:

Kenya Pace Evaluation Plan V1 (

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As an employee with the Elizabeth Glaser Pediatric AIDS Foundation, a subcontracted employee, partner or governmental personnel, consultant, intern, or visiting professional, I understand that I will be exposed to privileged participant/patient information in the conduct of my duties as a member of a research team. Examples include but are not limited to medical conditions, HIV status, medical treatments, finances, living arrangements, and sexual orientation. The study participant/patient's right to privacy is not only a policy of the Elizabeth Glaser Pediatric AIDS Foundation, but is specifically guaranteed by research ethical and governmental regulations. I understand that intentional or involuntary violation of the confidentiality policies is subject to appropriate disciplinary action(s) that could include being discharged from my position and/or being subject to other penalties. By signing this document, I further agree that:

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I have received, read, understand, and agree to comply with these guidelines.

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Signature Date (dd/mm/yyyy)

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Supervisor's Name and Signature Date (dd/mm/yyyy)