ORIGINAL RESEARCH

Closing the Gap in Pediatric HIV Case Finding: A Review of the PASS Strategy in Southern Nigeria

Moses Katbi[1], Doreen Magaji[1], Tessie Philips-Ononye[1], Emnet Aberra[2], Maryam Bello[3], Adefisayo Adedoyin[4], Rebecca Carthcart[1], Adeoye Adegboye[1], Abiye Kalaiwo[1], Angela Agweye[1], Akinyemi Atobatele[1], Abdulmalik Abubakar[1], Homsuk Swomen[5], Temitayo Odusote[1], Onyeka Igboelina[1] and Michele Russell[1]*

[1]Office of HIV and TB, USAID, Nigeria

[2]USAID, Washington DC, USA

[3]Hubert Department of Global Health, Emory Rollins School of Public Health, Atlanta, USA

[4]Independent Public Health Consultant

[5]UNFPA, Nigeria

Corresponding author: *Moses Katbi, MD, MPH, MBA, FRSPH, Division Chief Prevention and Community Programs, USAID, Nigeria, Tel: +2348180321186*

Abstract

Background: Achieving optimal treatment for all groups of individuals living with HIV is essential to attaining epidemic control. About 191,395 children and adolescents under 19 are living with HIV (C/ALHIV) with only 46,461 (24%) on treatment in Nigeria. In order to close this treatment gap, the pediatric ART saturation strategy (PASS), was developed between care and treatment team and orphans and vulnerable children (OVC) team to ensure identification and treatment of C/ALHIV and return of children who were lost-to-follow-up (LTFU) in the cascade of care back to HIV treatment.

Methods: We conducted HIV risk assessments for OVC and their households during a six-month intervention period (April-September 2019) in Akwa Ibom, Cross River and Lagos state identifying children at risk for HIV. HIV testing and positive results were compared at 6 months pre-intervention and 6 months post-intervention. Pearson Chi Square test was used to determine the difference between the outcome of pre-intervention and post-intervention groups. One-way ANOVA was used to determine the differences in the means of the HIV testing indicator data between the three states at 95% CI and post-Hoc test (Tukey HSD) was used to determine the differences (P < 0.05).

Results: A total of 116,078 children and adolescents across the three states (N = 116078; pre-PASS = 56190, post-PASS=59888) were tested and 3,809 positive C/ALHIV aged < 19, 24% (N = 894) and 77% (N = 2915) were identified pre and post-intervention respectively. Chi square shows a significant difference (χ^2 = 919.610, df -1, p < 0.0005) in pre- and post-intervention results for both HIV testing and positive tests. One-way ANOVA shows a significant difference in results between the states: Testing: F = 29617.131, df = 2, p < 0.000579 - (95% CI 13532.79-13884.88) and Positives: F = 2827.303, df = 2, p < 0.0005 (95% CI 679.81-708.48). Post-Hoc test was used to determine where the differences lie. The difference in HIV testing outcome is significant and vary among the three states (P < 0.05).

Conclusion: PASS intervention contributed significantly to HIV outcomes among children in the three states. This integrated strategy of ensuring identification and treatment of C/ALHIV and their return to care should be adopted and scaled up to close the gap in pediatric case finding.

List of Abbreviations

ART: Antiretroviral therapy; C/ALHIV: Children and Adolescents living with HIV; NAIIS: National AIDS Impact and Indicator Survey; OVC: Orphans and vulnerable children; PEPFAR: The President's Emergency Funds for AIDS Relief; PLHIV: People living with HIV

Introduction

Coverage of critical HIV interventions among children remains low even though evidence reveals that early ART initiation can improve the lives of HIV positive

Katbi et al. Int J Virol AIDS 2020, 7:068

• Page 1 of 6 •

children [1]. Globally, 5 percent of people living with HIV (PLHIV) are children under the age of 15 [1]. Considered under the groups vulnerable to HIV infection, children under 15 also account for about 9 percent of all new infections and 13 percent of all AIDS-related deaths [1]. Ensuring optimal uptake of antiretroviral therapy (ART) among C/ALHIV remains a major challenge to achieving epidemic control of HIV due to inequality in access to treatment. HIV programs in different countries often demonstrate better outcomes with adult ART treatment compared to pediatric ART. For C/ALHIV, there is a concerning, well-known gap in HIV treatment. The World Health Organization (WHO) recognized that children are often not included in successful ART programs [3]. Several factors have been associated with this, ranging from overlooking the pediatric aspect of treatment to inadequate programmatic effort and resources to achieve optimal treatment among children. Globally, out of the 1.7 million CLHIV aged 0-14, only 54 percent were receiving life-saving ART in 2018 constituting a gap of 918,000 (46%) [1]. In Nigeria, the HIV prevalence among persons aged 15-49 is 1.5% according to the NAIIS report with about 1,900,000 PLHIV [4]. Recent statistics estimates HIV prevalence among children and adolescents aged <19 to be less than 1 percent, equivalent to about 191,395 children and adolescents. Only about 46,461 of them are on treatment through the President's Emergency Plan for AIDS Relief (PEPFAR) program in Nigeria

In order to achieve HIV epidemic control by 2030, HIV interventions and programs must focus on identifying positive C/ALHIV, linking them to treatment and ensuring retention and viral suppression. To achieve this, country programs must estimate the total number of PLHIVs and C/ALHIV, to identify gaps in pediatric treatment. Specific interventions to address such gaps, such as PASS, are required to improve treatment. This is further improved when programs build and implement models that create and strengthen linkages between community and facility programs [1]. The USAID Nigeria PEPFAR program realized the need to develop a robust community-facility strategy between the OVC and facility treatment programs to improve pediatric case finding and ART uptake. Thereupon, the pediatric ART saturation strategy (PASS) was introduced in April 2019. The PASS is a community-focused intervention that uses a family centered approach bringing together community case management, index case testing, and strengthened community-clinic linkage with a health facility point of contact. The approach supports PEPFAR Nigeria's surge efforts in the focus states of Akwa Ibom, Cross River and Lagos. The PEPFAR surge project was developed as a strategic response to ensure that Nigeria meets up with the UNAIDS 90-90-90 target by 2020 for all PLHIV due to significant gaps noticed in universal access to ART and sub-optimal viral load suppression for C/ALHIV on treatment. PASS adopts an integrated service model in providing layered services to Nigeria's

priority OVC sub-populations i.e. children and adolescents with the goal of improving pediatric case finding and linkage to ART services. The PASS ensures that eligible children are provided with HIV testing services and positive children followed up to access ART services through a mix of community and facility interventions focused at perceived barriers and drivers to make ART more accessible.

The PASS strategy targeted improvement in pediatric case finding by scaling up identification of new HIV positive children from the community, enrolling C/ALHIV from health facilities who are referred for OVC services and tracking C/ALHIV who were lost to follow up (LTFU) with support of network of PLHIV. PASS also ensured testing at EID points for at risk adolescents' girls and young women (AGYW), especially teenage mothers, adolescents with STI, and out-of-school teenagers. The following strategic approach was utilized for implementation:

1. Case management processes: Identification of eligible OVC using needs and risk assessments at the household level, enrolment into care, case plan development, HIV counselling and testing (HTS), service provision, referrals to ART and other health services and case plan completion.

2. Assisted referral services for clients identified as at risk of HIV to clinic facilities for HTS and ART services.

3. Scaling up case finding and linkage to treatment in communities without a clinic facility and hard to reach areas (such as creeks and riverine communities).

4. Strong collaboration with government at state and local government.

5. Strengthening community - Facility Linkages through partnership with HIV care and treatment implementing partners and OVC implementing partners.

6. Incentivized enrolment and retention in care.

7. Partnership with the care and treatment services, index client tracking (ICT) team and other stakeholders in communities and use of genealogy testing.

The aim of this study is to elucidate the effect of PASS on paediatric case identification in three high burden states in Nigeria.

Methodology

Study settings

This community and facility intervention-based study was conducted in three states: Akwa Ibom, Cross River and Lagos, representing the southern region of Nigeria.

Study design and participants

This is an uncontrolled interventional study involving OVC under the age of 19 years as the target population. Sample size was non-randomly selected as all

Table 1: Frequency table showing HIV testing uptake and new positives identified among children before and after the PASS intervention disaggregated by state.

| States | 6 months pre-intervention period | | | | | | 6 months intervention period | | | | | | Grand Total | |
| | Quarter 1 | | Quarter 2 | | Total | | Quarter 3 | | Quarter 4 | | Total | | | |
	HTS	POS	HTS	POS	HTS	POS	HTS	POS	HTS	POS	HTS	POS	HTS	POS
Akwa Ibom	16802	234	13111	250	29913	484	16969	952	18412	1188	35381	2140	65294	2624
Cross Rivers	4457	86	3870	120	8327	206	5104	260	3585	254	8689	514	17016	720
Lagos	9616	113	8334	91	17950	204	6546	136	9272	125	15818	261	33768	465
Total	30875	433	25315	461	56190	894	28619	1348	31269	1567	59888	2915	116078	3809

HTS - Number of HIV tests conducted; POS - Number of new HIV positive children and adolescents identified

children under the age of 19 years at risk of HIV were targeted, screened, tested and those who were positive were enrolled in care. Inclusion criteria included being under 19 years, living with HIV positive biologic parents, children of key population groups, children with history of violence, being enrolled on the OVC program with unknown HIV status, and being LTFU. We conducted family-based testing for biological children of PLHIV and female sex workers (FSW) and linked positive children to treatment.

We conducted HIV risk assessments for those included during the intervention period of six months identifying children at risk for HIV. A comprehensive list of children LTFU was generated at clinic facilities with each child followed up by an OVC case manager embedded at the facility and brought back to care and linked to the OVC program.

Data collection

Data collection took place in health facilities where we pulled out list of PLHIVs from Retention and Audit Determination Tool (RADET) between April - October 2019. The biological children of these PLHIVs were elicited and tracked after obtaining the consent of the parents and explaining the need to test their children to them. The list of children was collected on an excel sheet. We identified OVCs at high risk of HIV at household level using the modified Banderson tool. All identified high risk children were offered HIV testing and counselling with a rapid two-test algorithm in accordance with Nigeria's national guidelines, with onsite reporting of results. Data was then transported to SPSS version 24 for analysis.

HIV Positive OVC were commenced on antiretroviral therapy and entered into Electronic Medical Record (EMR) where RADET is generated and the National OVC Management Information System (NOMIS), the OVC database after enrollment into the OVC program.

Measurement and data analysis

OVC classified as high risk using the modified Bandason tool were tested and those who tested positive were linked to treatment. HIV Testing and positive results 6 months pre-intervention and 6 months post-in-

Table 2: Chi Square result of the Pass intervention study.

	Value	df	Asymptotic Significance (2 sided)
Pearson's Chi-Square	919.401[a]	1	0.000
Continuity correction	918.401	1	0.000
Likelihood ratio	974.244	1	0.000
Linear by Linear Association	919.602	1	
N of Valid Cases	119887		

a. 0 cells (0.0%) have expected count less than 5.

tervention were compared. Pearson Chi Square test was used to determine the difference between the outcome of pre-intervention and post-intervention groups. One-way analysis of variance (ANOVA) was used to determine the differences in the means of the testing indicator data between the three states at 95% CI. Post-Hoc test (Tukey HSD) was used to determine where the differences lie.

Ethical statement

This study involving human participants followed the ethical standards of the Institutional Research Committee and the Helsinki declaration. Consent and permission by a parent, guardian or authorized representative were obtained for the OVC under the age of 18 years. The PEPFAR program in Nigeria also had approval from the IRB to carry out program related research.

Results

Comparison of pre and post intervention tests and positives

We conducted a total of 116,078 HIV tests and identified 3,809 new HIV positive children and adolescents aged < 19 years during the pre-intervention and intervention periods. 56,290 HIV tests were conducted during the first half of the program year (Quarters 1 and 2) preceding the PASS intervention with only 894 new HIV positive children and adolescent identified during that period. During the second half of the program year (Quarters 3 and 4, intervention period) 59,888 tests were conducted, and 2,915 HIV positive children were identified using PASS. Table 1 shows the disaggregation

of the indicators by state.

Chi square test

Table 2 shows that the difference observed in the data was statistically significant (Pearson's Chi square = 919.401, degree of freedom = 1, continuity correction = 918.401, p < 0.05.

ANOVA descriptive statistics

Description of the data summary for ANOVA test is shown in Table 3.

Comparison of the outcomes between and within the states

The difference in HTS outcome differs significantly from one state to the other as shown by Tukey HSD Post Hoc test. Akwa Ibom state outcome is significantly different from those of the other two state. We recorded better outcome in this state (Table 4).

Discussion

Diagnosis of HIV infection among children has been inadequate because of multiple challenges faced in terms of access to testing and parental consent [5]. This is due in part to lack of necessary investment and resources for adequate testing and development of child and adolescent-friendly care and treatment programs [6]. This study evaluated an intervention to improve the HIV case finding among the age group 2-19. With an estimated 15.2 million children orphaned by HIV/AIDS in Sub-Saharan Africa, the need to scale up and bring HIV testing closer to children who need it the most is critical to the epidemic control of HIV infection [7]. The PASS intervention utilized targeted community-initiated testing and counseling strategies through risk assessment of OVC households to increase HIV testing uptake and case finding among children and adolescents. Pre-intervention period (Quarters 1 and 2) consisted of largely clinical approach for case findings with interventions that does not directly target biological children of PLHIV. Program implementation during this period was also routine and conventional. However, during the six months (Quarters 3 and 4) intervention period, targeted case finding approaches including the introduction of the clinical and OVC integrated collaborative approach (PASS), was introduced which saw about 59, 888 tests

Table 3: Descriptive statistics for ANOVA.

		N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
						Lower Bound	Upper Bound		
HTS	Akwa Ibom	2624	17239.85	1513.541	29.547	17181.91	17297.79	13111	18412
	Cross Rivers	720	4285.18	669.283	24.943	4236.21	4334.15	3585	5104
	Lagos	465	8374.75	1254.055	58.155	8260.47	8489.03	6546	9616
	Total	3809	13708.83	5541.737	89.793	13532.79	13884.88	3585	18412
POS	Akwa Ibom	2624	927.94	342.938	6.695	914.81	941.06	234	1188
	Cross Rivers	720	213.77	69.027	2.572	208.72	218.82	86	260
	Lagos	465	118.65	16.025	0.743	117.19	120.11	91	136
	Total	3809	694.14	451.307	7.313	679.81	708.48	86	1188

Table 4: Result of Tukey HSD Post-Hoc test for multiple comparison of the outcomes between and within the states.

Indicators			Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
HTS	Akwa Ibom	Cross Rivers	12954.665*	57.302	0.000	12820.31	13089.02
		Lagos	8865.100*	68.531	0.000	8704.42	9025.78
	Cross Rivers	Akwa Ibom	-12954.665*	57.302	0.000	-13089.02	-12820.31
		Lagos	-4089.565*	81.031	0.000	-4279.55	-3899.58
	Lagos	Akwa Ibom	-8865.100*	68.531	0.000	-9025.78	-8704.42
		Cross Rivers	4089.565*	81.031	0.000	3899.58	4279.55
POS	Akwa Ibom	Cross Rivers	714.169*	12.046	0.000	685.93	742.41
		Lagos	809.289*	14.407	0.000	775.51	843.07
	Cross Rivers	Akwa Ibom	-714.169*	12.046	0.000	-742.41	-685.93
		Lagos	95.119*	17.034	0.000	55.18	135.06
	Lagos	Akwa Ibom	-809.289*	14.407	0.000	-843.07	-775.51
		Cross Rivers	-95.119*	17.034	0.000	-135.06	-55.18

*The mean difference is significant at P < 0.05.

being conducted, and the identification of 2,915 HIV positive children.

This study shows up to three-fold increase in the number of children found to be HIV infected despite a marginal increase in HIV testing with HIV positivity rate of 1.6% at pre-intervention and 4.9% at post intervention. Chi square shows a significant difference in the pre- and post-intervention results for testing and positives. Additionally, we carried out a one-way ANOVA which shows a significant difference in results between the states as seen in Table 3. We showed where the difference lies between the states using a Post-Hoc test which revealed a significant difference in HTS outcome across board ($P < 0.05$). This finding is consistent with two studies carried out in Cameroon that observed that targeted provider-initiated testing and counselling (PITC) is superior to blanket PITC in HIV case finding in children [8,9]. Findings are also similar to two other studies in Malawi by Simon KR, et al. [10] and Saeed A, Rachael AK, et al. [11] that shows that in order to improve pediatric case finding of HIV, a one-size fits all approach for HIV programming would be less effective and therefore targeted and case specific approaches need to be utilized. The finding is also consistent with the Tingathe Surge HIV program in Malawi, where a multi-strategy approach was used to accelerate HIV case finding among pediatrics in Malawi [12]. The success of the intervention can be attributed in part to the fact that testing and treatment services were made available closer to where the children who need them most live with a well-planned social support system involving the OVC community structure in active collaboration and linkage with healthcare facilities. Such collaboration between community and clinic facility systems are often fragile and difficult to implement. We overcame this barrier by scaling up the training of health care workers and community volunteers on HIV testing services and how to ensure effective collaboration in partnership with existing structures at the state level. Active participation of the state government was critical to the success of the intervention which according to this study has been found to be effective. Involvement of OVC households and parents was found to be instrumental in ensuring faster parental consent, higher HIV testing uptake among high risk children and adolescents and overall, better yield. HIV case finding interventions that meet specific needs of the families and are driven by experiences from children-centered heath projects have been found to be successful [7]. This was found to be true also in our study. Our finding is also consistent with the finding in a similar setting in sub-Saharan Africa where only 31% of children were tested due to factors related to access and acceptability [5].

This study highlights the significance of a collaborative approach between health care and community infrastructures in order to improve HIV case finding among the pediatric age groups. Case finding among this population has often been a difficult task towards global epidemic control of HIV. According to our findings, utilizing existing program platforms such as the OVC platform has proven to be an effective and possibly cost-efficient way to improve pediatric and adolescent case finding. It also provides critical information for policy makers and program implementers on delivering effective and efficient HIV case finding project among children in Nigeria. Although PMTCT has made significant inroad into the vertical transmission of HIV infection, scale up of case finding of HIV in children and adolescents outside the PMTCT catchment age range is important to reach the goal of identifying at least 90% of children living with HIV and achieve epidemic control in Nigeria.

Conclusion

This study has demonstrated that a collaborative, targeted approach between clinic and community structures is an effective program model in improving HIV case finding among children and adolescent in Nigeria. Scale up of such innovative approach such as the PASS is recommended to fill gaps in pediatric case finding towards global HIV epidemic control.

Competing Interests

The authors certify that they have no potential conflict of interest in the subject matter or materials discussed in this manuscript.

Acknowledgements

Funding

Statement of Equal Authors' Contribution

Moses Katbi the lead author, led the design and writing of the manuscript and has the most significant contribution. Other authors contributed significantly to project implementation and were also involved in the design of PASS, analysis of results and writing of the manuscript.

References

1. UNICEF (2019) Pediatric Care and Treatment.

2. Hart D't, Musinguzi M, Ochen R, Katushabe J, Rujumba J (2016) Closing the gap in HIV prevention and care for

children: Early insights from a model that links communities and health care facilities in Uganda. Vulnerable Children and Youth Studies 11: 281-285.

3. WHO (2020) AIDS treatment for children.

4. UNAIDS (2020) Nigeria country analysis.

5. O'Donnell K, Yao J, Ostermann J, Thielman N, Reddy E, et al. (2014) Low rates of child testing for HIV persist in a high-risk area of East Africa. AIDS Care 26: 326-331.

6. Avert (2020) Children, HIV and AIDS.

7. Unaids.org. (2020). Children.

8. Yumo HA, Ajeh RA, Beissner M, Ndenkeh JN, Jr Sieleunou I, et al. (2019) Effectiveness of symptom-based diagnostic HIV testing versus targeted and blanket provider-initiated testing and counseling among children and adolescents in Cameroon. PLoS One 14: e0214251.

9. Penda CI, Moukoko CEE, Koum DK, Fokam J, Meyong

CAZ, et al. (2018) Feasibility and utility of active case finding of HIV-infected children and adolescents by provider-initiated testing and counselling: evidence from the Laquintinie hospital in Douala, Cameroon. BMC Pediatr 18: 259.

10. Simon KR, Flick RJ, Kim MH, Sabelli RA, Tembo T, et al. (2018) Family Testing: An Index Case Finding Strategy to Close the Gaps in Pediatric HIV Diagnosis. Journal of Acquired Immune Deficiency Syndromes 78: S88-S97.

11. Ahmed S, Sabelli RA, Simon K, Rosenberg NE, Kavuta E, et al. (2017) Index case finding facilitates identification and linkage to care of children and young persons living with HIV/AIDS in Malawi. Tropical medicine & international health: TM & IH, 22: 1021-1029.

12. Simon KR, Hartig M, Abrams EJ, Wetzel E, Ahmed S, et al. (2019) The Tingathe Surge: A multi-strategy approach to accelerate HIV case finding in Malawi. Public Health Action 9: 128-134.